

METAL PROGRESS

THE MAGAZINE OF MATERIALS AND PROCESS ENGINEERING

Volume 85
January 1964 through June 1964

ALLEN G. GRAY, *Editor;*
Editor, Periodical Publications, ASM

RALPH G. DERMOTT, *Managing Editor*

CARL R. WEYMUELLER
Associate Editor

FRED L. SIEGRIST
Associate Editor

ELIZABETH M. ALDRICH
Assistant Editor

FLOYD E. CRAIG
Art Director



Metal Progress Is Owned and Published by
THE AMERICAN SOCIETY FOR METALS
Metals Park, Ohio

Subject Index

The subject headings used in this index are chosen in accordance with the ASM-SLA Metallurgical Literature Classification, International (Revised) Edition, published by the American Society for Metals, 1958.

Aircraft

- Materials and Processing . . . What Does the Aerospace Industry Need?, by Ralph G. Dermott. . . . 3-75

Alloy steel

- Boron-Treated Steel in Retrospect, by Jerome Strauss (c) 5-122
Cooling Transformation Diagram for AISI 4140 1-98; (ds) 1-100
Cooling Transformation Diagram for AISI 43BV14 2-104; (ds) 2-106
En 16 and En 17 . . . Two English Automotive Steels, by Gerald F. P. Fox. . . 1-103
Flux Cored Wire Speeds Welding of "T-1" (sr) 2-121
Grain Size and Temper Brittleness, by J. M. Capus (d) 3-166
Nitriding Problems and Their Solutions, by Donald A. Dashfield. . . . 2-88
Nitriding, Sintering and Brazing by Glow Discharge, by Claude K. Jones and Stuart W. Martin. . . . 2-94
Nitriding Today, by Wilson Leeming. . . 2-86
Quenching Lean Alloys in Normal Oils, by Harold C. Stone. . . . 6-107

Aluminum

- Aluminum Heat Treated in Continuous Furnace (tn) 2-10
Aluminum Plates Formed in Cast Steel Dies (tn) 2-8
Another Gain for Aluminum (tn) 1-9
Automaker Builds Large Die Casting Plant (tn) 6-8
Canada's Metallurgists Meet, by H. P. Tardif (d) 4-174
Clean Aluminum Ingots Improve Properties of Castings (tn) 4-8
Color Standards for Painted Aluminum (tn) 2-7
Cooled Fixtures Improve Welds in Aluminum (tn) 1-10
Finishing of Aluminum in Europe, by F. C. Porter 1-95
A New Aluminum-Ceramic Composite, by R. Richard Palmisano and John Drager 6-113
Sintered Aluminum Bearings Tested in Diverse Applications (tn) 5-10
Technology Forecast '64. . . . 1-67

Aluminum alloys

- Big Seamless Bottles Store Liquid Helium (tn) 2-7
Electron Beam Welding of Large Structures, by William A. Wilson, P. Gordon Parks and Robert J. Schwinghamer 3-84
Liquid Methane Transported in Aluminum Tanks (tn) 2-9

Annealing

- Annealing Blackplate, by E. W. Williams (d) 2-188
Canada's Metallurgists Meet, by H. P. Tardif (d) 4-174
New Furnace for Strip Steel Trims Annealing Costs (tn) 5-9
Open Coil Annealing and Quality, by W. H. Minck (d) 6-156

Anodizing

- Advances in Anodizing Practices, by F. C. Porter (d) 4-182
Cooling Anodizing Baths, by Charles S. Cave (sr) 5-120

Automobiles

- Automakers Set Goals for Thermoplastics (tn) 1-8
En 16 and En 17 . . . Two English Automotive Steels, by Gerald F. P. Fox. . . 1-103
Plastics in European Automobiles, by David L. Dennison (d) 1-132
Reinforced Plastics in Cars and Trucks, by Fred L. Siegrist. . . . 5-105

Bands

- Banding in Steel, by T. R. Smith, J. S. Thomas and R. Goodall (d) 3-180

Bearings

- High Temperature Carburizing . . . Users Like the Process (Bearings), by James R. Easterday. . . . 5-78
How Inclusions Affect Bearings, by J. D. Murray and R. F. Johnson (d) . . . 4-156

- Inclusions and Bearing Endurance, by L. O. Uhrus (d) 3-188
Making Little Things, by David Krashe (d) 6-134
Self-Lubricated Bearings Operate in Vacuum, by D. J. Boes (d) 6-168
Sintered Aluminum Bearings Tested in Diverse Applications (tn) 5-10

Beryllium

- Big Beryllium Sheets (tn) 5-8
Major Advances Made in Fabrication of Beryllium (tn) 3-8
Status of Gas Cooled Reactor Program, by Ray M. Evans and Allan E. Goldman 3-118
Technology Forecast '64. . . . 1-67

Beryllium copper

- Mechanical Properties of Beryllium Copper Wire and Springs, by Ronald D. Crooks and William R. Johnson. . . 5-89

Biographies

- ASM President for 1963-64: Merrill A. Scheil, by John J. Chyle. . . . 6-94

Bonding

- Polymer Adhesive Bonds Vinyl to Metals, Glass and Wood (tn) 5-9

Boring

- Automatic Boring Machine Turns Out Accurate Differentials (tn) 2-9

Brazing

- Brazing Faucets With Silver Alloy (sr) . 3-124
Engineers Focus on . . . Fabrication in a Technical Age 4-9
Huge Vacuum Brazing Furnace (sr) . . 6-121
Nitriding, Sintering and Brazing by Glow Discharge, by Claude K. Jones and Stuart W. Martin. . . . 2-94
Springboard to the Space Age: Better Ways to Fabricate New Materials. . . 3-9

Brittleness

- Brittle Behavior in Materials, by G. T. Hahn and R. I. Jaffe (d) 5-177

Bronze

- Brass Company Introduces Stock Gear Blank Forgings (tn) 5-7

Bushings

- High Temperature Carburizing . . . Users Like the Process (Tractor Bushings), by Donald Rosenblatt. . . 5-79

Carbon steel

- Proper Wire Drawing Improves Cold Heading, by Frank L. Gill and William M. Baldwin, Jr. . . . 2-83

Carbon steel, low

- Canada's Metallurgists Meet, by H. P. Tardif (d) 4-174

Carburizing, high temperature

- Furnaces Do the Job, by Elton E. Staples 5-74
The Process Works, by Walter E. Jominy 5-70
Users Like the Process 5-77
Rolls, by Lynn E. Arnold 5-78
Anvil Rolls, by Glenn O. Ratliff . . . 5-78
Bearings, by James R. Easterday . . . 5-78
Tractor Bushings, by Donald R. Rosenblatt 5-79

Casting

- A New Aluminum-Ceramic Composite, by R. Richard Palmisano and John Drager 6-113

Casting, continuous

- Continuous Casting of Steel, by L. J. Gibson (d) 3-168
Copper Refinery Installs Continuous Casting Machine (tn) 4-8
Hollow Billets Continuously Cast (tn) . 1-10

Casting, investment

- Evaluating Investment Castings of Maraging Steel, by Raymond J. Wilcox 1-87

- Restoring Carbon in Investment Castings of Steel, by John Hockin 4-79

Cast iron

- Engineering for Economy With Gray Iron (sr) 1-109
Technology Forecast '64. . . . 1-67

Cast iron, white

- Alloyed White Iron Resists Corrosion and Abrasion (tn) 2-10

Ceramics

- Ceramic Coating Extends Life of Thermocouple Tubes (tn) 1-9
A New Aluminum-Ceramic Composite, by R. Richard Palmisano and John Drager 6-113
Springboard to the Space Age: Better Ways to Fabricate New Materials. . . 3-9
Technology Forecast '64. . . . 1-67

Cesium

- Materials for the Ion Rocket, by Joseph M. Lamberti and Neal T. Saunders (d) 3-191

Chromium

- Chromium Impregnated Steel . . . A New Muffler Material, by Bernard Trock and George W. Myrick . . . 4-115
A Versatile Chromium Diffusion Process, by A. L. Baldi. . . . 4-109

Chromium alloys

- Chromium-5% Magnesia for High Temperature Service, by W. C. O'Neal. . . 3-96
Dispersion Strengthened Chromium, by N. E. Ryan and C. S. Landau (d) . . 5-164

Chromium plate

- Road Tests of Nickel and Chromium Plates, by J. K. Dennis and T. E. Such (d) 2-177

Coatings

- Coatings for Pipelines, by Frank Costanzo (d) 4-180
New Test for Anodized Coatings (tn) . . 2-10

Cobalt

- Cobalt in High Speed Steels, by F. R. Morral (d) 6-150

Columbium alloys

- Welding Columbium Alloys, by J. M. Gerken and J. M. Faulkner (d) . . . 5-161A

Composite materials

- A New Aluminum-Ceramic Composite, by R. Richard Palmisano and John Drager 6-113

Computers

- Computers in Metalworking . . . Today and Tomorrow, by Carl R. Weymueller 2-109
Computer Takes on Foundry Quality Control (tn) 2-8

Copper

- Copper Refinery Installs Continuous Casting Machine (tn) 4-8
New Developments in Manufacture of Electron Tubes, by Walter H. Kohl. . . 5-88
New Lacquer Protects Copper (tn) . . . 3-8
Technology Forecast '64. . . . 1-67

Corrosion

- A Japanese Stainless Steel With Acid Resistance, by F. Tsukamoto. . . . 3-107
Materials That Resist Chemicals (d) . . 3-174
A New Approach to Corrosion . . . the Pourbaix Diagram, by A. G. Guy and F. N. Rhines. . . . 2-117
Technology Forecast '64. . . . 1-67

Cutting fluids

- Cutting Fluids, by Clyde A. Sluhan (d) . 5-166

Deburring

- Abrasive Jet Deburs Tiny Parts (tn) . . 5-9

Definitions

- More on the Old Terms, by H. P. Nielsen (c) 5-124

(na) Atomic Age; (br) Book Review; (c) Correspondence; (cp) Critical Points; (d) Digest; (ds) Data Sheet; (lm) Light Metallurgy; (sr) Short Runs; (tn) Technical News

Old Terms Preferred, by J. H. Janssen (c).....	5-122	Fatigue	Fatigue in "Near Safe" Specimens, by W. A. Wood, S. McK. Cousland and K. R. Sargent (d).....	6-176	Golden Gate Metals Conference	Springboard to the Space Age: Better Ways to Fabricate New Materials.....	3-9													
What's Wrong With the Old Terms?, by H. P. Nielsen (c).....	1-112	Fatigue tests	Fatigue in Mild Steel, by S. T. Rolfe and W. H. Munse (d).....	5-162	Grain growth	Grain Growth in Iron, by J. L. Walter (d).....	6-158													
What's Wrong With the Old Terms? ... Nothing, by Kailash C. Joshi (c).....	3-126	A New Fatigue Testing Method, by George Martin (c).....	5-122	Grain size	Conversion of Intercept Density to Grain Size, by John E. Hilliard (ds).....	5-102	Estimating Grain Size by the Intercept Method, by John E. Hilliard.....	5-99												
What's Wrong With the Old Terms? ... Plenty, by Samuel J. Rosenberg (c).....	3-126	Why Some Fatigue Failures Occur, by B. Cina (d).....	5-144	Graphite	New Graphite Resists Oxidation (tn).....	5-10	Status of Gas Cooled Reactor Program, by Ray M. Evans and Allan E. Goldman.....	3-118												
Degassing, vacuum		Finishing	Finishing of Aluminum in Europe, by F. C. Porter.....	1-95	Technology Forecast '64.....	1-67	Hardening, dispersion	Dispersion Strengthened Chromium, by N. E. Ryan and C. S. Landau (d).....	5-164											
Vacuum Degassing and Induction Melting for Ultraclean Alloys (sr).....	1-110	Specifying Surface Finishes, by H. L. Seekins (d).....	5-150	Finishing, vibratory	Dispersion Strengthened Nickel—Its Properties, by Charles R. Manning, Jr., Dick M. Royster and David N. Braski (d).....	6-182	Technology Forecast '64.....	1-67												
Diffusion		Technology Forecast '64.....	1-67	Fabricating and Coating Molybdenum Alloy Parts, by Gary Michaelson.....	3-88	Hardening, induction	Automatic Induction Hardening Line (sr).....	6-121												
Canada's Metallurgists Meet, by H. P. Tardif (d).....	4-174	Flaw detection	An Innovation in Inspection and Control ... Nondestructive Metallography, by P. A. Jacquet.....	2-114	Hardness conversions	Hardness Conversion for Forged Steel Rolls, by Amos A. Bradd and William F. Shore.....	6-102; (ds) 6-104	Heading, cold	Proper Wire Drawing Improves Cold Heading, by Frank L. Gill and William M. Baldwin, Jr.....	2-83										
Diffusion coating		Inspecting Surfaces From a Distance, by R. A. Betz.....	1-91	Fluxes	New Submerged Arc Flux for Inconel 82 Filler Metal (tn).....	6-8	Heat resisting alloys	Heat Treatment of René 41, by John T. Stacy.....	3-92											
Chromium Impregnated Steel ... A New Muffler Material, by Bernard Trock and George W. Myrick.....	4-115	Physics in Nondestructive Testing, by Warren J. McGonagle (d).....	5-130	Foil	Tungsten Foil Produced in Large Sizes (tn).....	1-8	Machining Difficult Materials ... René 41, by Michael Field, Norman Zlatin and Robert T. Jameson.....	6-80	Machining René 41 in the Shop, by J. R. Ewell.....	6-85										
A Versatile Chromium Diffusion Process, by A. L. Baldi.....	4-109	Radiographing Hot Blooms, by A. Kohn (d).....	3-172	Weldable Circuit Board Covered With Three Foil Layers (tn).....	6-8	Forecast	Technology Forecast '64.....	1-67	What Technical Management Expects.....	1-75										
Drawing		Sensitive Eddy Current Tester Identifies Defects (tn).....	1-7	Forging	The Impact of New Materials on Manufacturing.....	6-72	Forming	Cold Forming Fasteners of High Strength Steel, by Jacob L. Peterson and R. M. Smith.....	6-91	Engineers Focus on ... Fabrication in a Technical Age.....	4-9									
Variables Which Affect Drawability, by R. D. Butler, B. B. Moreton and D. V. Wilson (d).....	6-138	Thermographic Methods in World War II, by Taber de Forest (c).....	6-126	Working With Refractory Metals ... Forming, by Robert C. Bertossa (d).....	3-138	Forming	Cold Forming Fasteners of High Strength Steel, by Jacob L. Peterson and R. M. Smith.....	6-91	Engineers Focus on ... Fabrication in a Technical Age.....	4-9										
Drawing, deep		Fluxes	New Submerged Arc Flux for Inconel 82 Filler Metal (tn).....	6-8	Forming	Cold Forming Fasteners of High Strength Steel, by Jacob L. Peterson and R. M. Smith.....	6-91	Engineers Focus on ... Fabrication in a Technical Age.....	4-9	The Impact of New Materials on Manufacturing.....	6-72									
Deep Drawing Lubricants, by D. R. Mear, H. H. Topper and D. A. Ford (d).....	6-178	Foil	Tungsten Foil Produced in Large Sizes (tn).....	1-8	Forecast	Technology Forecast '64.....	1-67	What Technical Management Expects.....	1-75	Forging	The Impact of New Materials on Manufacturing.....	6-72								
How Do You Test a Deep Drawing Steel?, by Gilles Pomey.....	5-95	Weldable Circuit Board Covered With Three Foil Layers (tn).....	6-8	Forecast	Technology Forecast '64.....	1-67	What Technical Management Expects.....	1-75	Forming	Cold Forming Fasteners of High Strength Steel, by Jacob L. Peterson and R. M. Smith.....	6-91	Engineers Focus on ... Fabrication in a Technical Age.....	4-9							
Editorials		Forming	Cold Forming Fasteners of High Strength Steel, by Jacob L. Peterson and R. M. Smith.....	6-91	Engineers Focus on ... Fabrication in a Technical Age.....	4-9	The Impact of New Materials on Manufacturing.....	6-72	Ultrasonics: An Aid to Metal Forming?, by Bertwin Langenecker, Clifford W. Fountain and Vernon O. Jones.....	4-97	Working With Refractory Metals ... Forming, by Robert C. Bertossa (d).....	3-138	Foundry practice	Computer Takes on Foundry Quality Control (tn).....	2-8					
An Age of Specialization, by William H. Colner (cp).....	5-69	Foundry practice	Computer Takes on Foundry Quality Control (tn).....	2-8	Fracture	How Failures Occur ... Experiences in the Field, by Frank R. Larson and Frank L. Carr.....	3-109	How Failures Occur ... Topography of Fracture Surfaces, by Frank R. Larson and Frank L. Carr.....	2-74	The Value of Failure Analysis, by Allen G. Gray (cp).....	2-73	Fuel	Improved Fuel Gas Competes With Acetylene, Propane and Natural Gas (tn).....	5-10	Gears	Brass Company Introduces Stock Gear Blank Forgings (tn).....	5-7			
Challenge in Materials Engineering, by Allen G. Gray (cp).....	6-71	Fracture	How Failures Occur ... Experiences in the Field, by Frank R. Larson and Frank L. Carr.....	3-109	How Failures Occur ... Topography of Fracture Surfaces, by Frank R. Larson and Frank L. Carr.....	2-74	The Value of Failure Analysis, by Allen G. Gray (cp).....	2-73	Fuel	Improved Fuel Gas Competes With Acetylene, Propane and Natural Gas (tn).....	5-10	Gears	Brass Company Introduces Stock Gear Blank Forgings (tn).....	5-7	Ghosts	A Metallographic Valentine, by James L. English (c).....	2-124			
Concern for the Future, by Allen G. Gray (cp).....	3-73	Fuel	Improved Fuel Gas Competes With Acetylene, Propane and Natural Gas (tn).....	5-10	Gears	Brass Company Introduces Stock Gear Blank Forgings (tn).....	5-7	Ghosts	A Metallographic Valentine, by James L. English (c).....	2-124	No Shmoos Is Good Shmoos, by O. E. Accountius (c).....	1-112	Tungsten Termite, by David S. Gould (c).....	2-124	Water Wonderland, by F. E. Alberts (c).....	2-124	The Zinc Cross, by Virgil R. Friebe and Lawrence E. Townsend (c).....	3-126		
A Materials Engineer Looks at Plastics, by Leonard J. Lamberg (cp).....	4-73	Ghosts	A Metallographic Valentine, by James L. English (c).....	2-124	No Shmoos Is Good Shmoos, by O. E. Accountius (c).....	1-112	Tungsten Termite, by David S. Gould (c).....	2-124	Water Wonderland, by F. E. Alberts (c).....	2-124	The Zinc Cross, by Virgil R. Friebe and Lawrence E. Townsend (c).....	3-126	Glass	Strengthening Glass With Chemicals, by Joseph S. Olcott (d).....	1-141	High strength steel	Cold Forming Fasteners of High Strength Steel, by Jacob L. Peterson and R. M. Smith.....	6-91	Springboard to the Space Age: Better Ways to Fabricate New Materials.....	3-9
The New Year: Problems, Challenges, Accomplishments, by Allen G. Gray (cp).....	1-83	Glass	Strengthening Glass With Chemicals, by Joseph S. Olcott (d).....	1-141	High strength steel	Cold Forming Fasteners of High Strength Steel, by Jacob L. Peterson and R. M. Smith.....	6-91	Springboard to the Space Age: Better Ways to Fabricate New Materials.....	3-9	Hydrogen	Bulk Ultrapure Hydrogen Stored on Site (tn).....	1-8	Ultrapure Hydrogen in Metal Processing, by George L. Matlack.....	3-114	Impact test	Impact Testing With an Instrumented Machine, by H. P. Tardif and H. Marquis.....	2-79	Induction melting	Vacuum Degassing and Induction Melting for Ultraclean Alloys (sr).....	1-110
The Value of Failure Analysis, by Allen G. Gray (cp).....	2-73	High purity metals	Canada's Metallurgists Meet, by H. P. Tardif (d).....	4-17	High strength steel	Cold Forming Fasteners of High Strength Steel, by Jacob L. Peterson and R. M. Smith.....	6-91	Springboard to the Space Age: Better Ways to Fabricate New Materials.....	3-9	Hydrogen	Bulk Ultrapure Hydrogen Stored on Site (tn).....	1-8	Ultrapure Hydrogen in Metal Processing, by George L. Matlack.....	3-114	Impact test	Impact Testing With an Instrumented Machine, by H. P. Tardif and H. Marquis.....	2-79	Induction melting	Vacuum Degassing and Induction Melting for Ultraclean Alloys (sr).....	1-110
Electrical equipment		High strength steel	Cold Forming Fasteners of High Strength Steel, by Jacob L. Peterson and R. M. Smith.....	6-91	Springboard to the Space Age: Better Ways to Fabricate New Materials.....	3-9	Hydrogen	Bulk Ultrapure Hydrogen Stored on Site (tn).....	1-8	Ultrapure Hydrogen in Metal Processing, by George L. Matlack.....	3-114	Impact test	Impact Testing With an Instrumented Machine, by H. P. Tardif and H. Marquis.....	2-79	Induction melting	Vacuum Degassing and Induction Melting for Ultraclean Alloys (sr).....	1-110			
Weldable Circuit Board Covered With Three Foil Layers (tn).....	6-8	Hydrogen	Bulk Ultrapure Hydrogen Stored on Site (tn).....	1-8	Ultrapure Hydrogen in Metal Processing, by George L. Matlack.....	3-114	Impact test	Impact Testing With an Instrumented Machine, by H. P. Tardif and H. Marquis.....	2-79	Induction melting	Vacuum Degassing and Induction Melting for Ultraclean Alloys (sr).....	1-110								
Electron beam melting		Impact test	Impact Testing With an Instrumented Machine, by H. P. Tardif and H. Marquis.....	2-79	Induction melting	Vacuum Degassing and Induction Melting for Ultraclean Alloys (sr).....	1-110													
Electron Beam Melted Tungsten, by Walter R. Witzke, Earl C. Sutherland and Gordon K. Watson (d).....	4-186	Induction melting	Vacuum Degassing and Induction Melting for Ultraclean Alloys (sr).....	1-110																
Electronic equipment																				
New Developments in Manufacture of Electron Tubes, by Walter H. Kohl.....	5-83																			
Electroplating																				
Bronze Plating Replaces Cadmium on Electronic Parts (tn).....	5-7																			
Embrittlement, by hydrogen																				
How Hydrogen Affects Maraging Steel, by Hugh R. Gray and Alexander R. Troiano.....	4-75																			
Hydrogen in Titanium, by D. N. Williams (d).....	3-154																			
Materials and Processing ... What Does the Aerospace Industry Need?, by Ralph G. Dermott.....	3-75																			
Embrittlement, temper																				
Grain Size and Temper Brittleness, by J. M. Capus (d).....	3-166																			
Eutectics																				
Eutectic Structures, by B. E. Sundquist, R. Bruscatto and L. F. Mondolfo (d).....	2-178																			
Extrusion																				
Engineers Focus on ... Fabrication in a Technical Age.....	4-9																			
Working With Refractory Metals ... Forming, by Robert C. Bertossa (d).....	3-138																			
Extrusion, hydrostatic																				
Hydrostatic Extrusion ... a Technique of Promise.....	5-87																			
Hydrostatic Extrusion of Metals, by H. L. D. Pugh (d).....	5-146																			
Fabrication																				
Heat Treatment and Fabrication of Wrought Titanium Alloys (ds).....	4-106																			
Failure analysis																				
How Failures Occur ... Experiences in the Field, by Frank R. Larson and Frank L. Carr.....	3-109																			
How Failures Occur ... Topography of Fracture Surfaces, by Frank R. Larson and Frank L. Carr.....	2-74																			

(aa) Atomic Age; (br) Book Review; (c) Correspondence; (cp) Critical Points; (d) Digest; (ds) Data Sheet; (lm) Light Metallurgy; (sr) Short Runs; (tn) Technical News

Iron			
Grain Growth in Iron, by J. L. Walter (d).....	6-158		
Iron alloys			
A New Approach to Corrosion . . . the Fourballs Diagram, by A. G. Guy and F. N. Rhines.....	2-117		
Iron powder			
High Velocity Compaction of Iron Pow- der, by Eugene M. Stein, John R. Van Orsdel and Peter V. Schneider.....	4-83		
Hints on Heat Treating Parts of Pow- dered Iron, by Vernon Pryer.....	4-91		
Iron powder parts			
Iron Powder Parts . . . Their Processing and Evaluation, by Norbert K. Koebel and Russell F. Novy (d).....	2-156		
Joining			
Engineers Focus on . . . Fabrication in a Technical Age.....	4-9		
The Impact of New Materials on Manu- facturing.....	6-72		
Working With Refractory Metals . . . Joining, reported by Robert C. Ber- tossa (d).....	4-130		
Low temperature alloys			
Springboard to the Space Age: Better Ways to Fabricate New Materials.....	3-9		
Low temperature forming			
Pressure Vessels Formed at Cryogenic Temperatures (sr).....	4-124		
Lubricants			
Deep Drawing Lubricants, by D. R. Mear, H. H. Topper and D. A. Ford (d).....	6-178		
Machining			
Engineers Focus on . . . Fabrication in a Technical Age.....	4-9		
Machining Difficult Materials . . . René 41, by Michael Field, Norman Zlatin and Robert T. Jameson.....	6-80		
Machining René 41 in the Shop, by J. R. Ewell.....	6-85		
Machining With Electricity, by Makoto Okoshi and Kunio Uyehara (d).....	6-196		
Technology Forecast '64.....	1-67		
Machining, chemical			
Fabricating and Coating Molybdenum Alloy Parts, by Gary Michaelson.....	3-88		
Machining, electrochemical			
ECM: Potential Method for Making Pre- cision Gears (tn).....	2-8		
Electrochemical Machining, by Walter B. Kleiner (d).....	6-148		
Magnesium			
Technology Forecast '64.....	1-67		
Magnesium alloys			
Featherweight Alloy Gets Aerospace As- signments (tn).....	5-8		
Magnetic materials			
Improved Magnetic Alloy (tn).....	2-10		
Maraging steel			
Evaluating Investment Castings of Mar- aging Steel, by Raymond J. Wilcox.....	1-87		
Features of Cast Maraging Steel, by J. B. Dabney and H. R. Larson (d).....	6-186		
How Hydrogen Affects Maraging Steel, by Hugh R. Gray and Alexander R. Troiano.....	4-75		
How Maraging Steel Transforms, by Donald M. Cheney.....	5-92		
Technology Forecast '64.....	1-67		
Welding 18% Ni Maraging Steel by Electron Beam, by Marvin L. Kohn and Charles D. Schaper.....	5-93		
Metallography			
Metallography at the Atomic Level, by A. H. Cottrell (d).....	2-170		
Metallography, replica technique			
An Innovation in Inspection and Control . . . Nondestructive Metallography and Microfractography, by P. A. Jacquet.....	2-114		
Metallography, specimen preparation			
Preparing Infiltrated Tungsten for Ex- amination, by Robert E. Matt and Isamu Yoshioka.....	4-95		
Metalworking			
Metalworking Counts Up Big Year (tn).....	2-7		
Microstructure			
Microstructures Affect Weld Strength, by J. M. Wheatley and R. G. Baker (d).....	2-184		
Missile cases			
Alloys for Rocket Cases (d).....	6-184		
Producing Motor Cases for the Titan III-C (sr).....	2-122		
Missiles			
Are Missile Structures Overdesigned? (tn).....	3-8		
Molybdenum			
How Ductile Is Molybdenum Tubing?, by Laurence C. Shaheen.....	5-112		
How Strong Is Molybdenum Sheet?, by Alan K. Hegedus.....	5-115		
Molybdenum alloys			
Fabricating and Coating Molybdenum Alloy Parts, by Gary Michaelson.....	3-88		
Seamless Tubing Made From Re-50Mo Alloy (tn).....	2-10		
Neutron radiation			
Nuclear Activation Analysis, by Richard E. Wainerdi and Normand P. DuBeau (d).....	1-143		
Nickel			
Dispersion Strengthened Nickel—Its Properties, by Charles R. Manning, Jr., Dick M. Royster and David N. Braski (d).....	6-182		
New Developments in Manufacture of Electron Tubes, by Walter H. Kohl.....	5-83		
Nickel alloys			
Faster Nickel Plating With Sulfamate Solutions, by Fred L. Siegrist.....	3-101		
The Impact of New Materials on Manu- facturing.....	6-72		
"New Heat Treatments for Inconel X-750": a Correction, by S. B. Lasday (c).....	1-112		
Nickel plate			
How Addition Agents Affect Stresses in Nickel Plate, by S. A. Watson (d).....	4-188		
New Nickel Plating Processes for Im- proved Corrosion Resistance, by Rich- ard K. Barnett.....	6-87		
Road Tests of Nickel and Chromium Plates, by J. K. Dennis and T. E. Such (d).....	2-177		
Nitriding			
Nitriding Problems and Their Solutions, by Donald A. Dashfield.....	2-88		
Nitriding, Sintering and Brazing by Glow Discharge, by Claude K. Jones and Stuart W. Martin.....	2-94		
Nitriding Today, by Wilson Leeming.....	2-86		
Nuclear power			
Technology Forecast '64.....	1-67		
Nuclear reactors			
Chromium-5% Magnesia for High Tem- perature Service, by W. C. O'Neal.....	3-96		
Status of Gas Cooled Reactor Program, by Ray M. Evans and Allan E. Gold- man.....	3-118		
The Impact of New Materials on Manu- facturing.....	6-72		
Oxidation			
Calcium Chloride Rusts Steel, by Joseph Geschelin (d).....	4-161		
Painting			
Waterborne Paints "Plated" on Auto Parts (tn).....	2-8		
Phosphating			
Electronic Control Monitors Phosphating Systems (tn).....	5-8		
Physical properties			
Coefficient of Adhesion in Metals, by M. E. Sikorski (d).....	5-175		
Pipeline			
Coatings for Pipelines, by Frank Co- stanzo (d).....	4-180		
Plasma processing			
Welders Look at Three New Processes, by Ralph G. Dermott.....	4-122		
Plastic deformation			
Canada's Metallurgists Meet, by H. P. Tardif (d).....	4-174		
Principles of Plastic Deformation, by Otto Kienzie (d).....	6-172		
Plastics			
Automakers Set Goals for Thermo- plastics (tn).....	1-3		
The Impact of New Materials on Manu- facturing	6-72		
Materials and Processing . . . What Does the Aerospace Industry Need?, by Ralph G. Dermott.....	3-75		
A Materials Engineer Looks at Plastics, by Leonard J. Lamberg (cp).....	4-73		
Plastics in European Automobiles, by David L. Dennison (d).....	1-132		
Plating Thermoplastics for Exterior Use (tn).....	4-7		
Some Notes on Russian Plastics, by Arthur B. Tesmen (d).....	4-168		
Technology Forecast '64.....	1-67		
Teflon Film Protects Process Rolls (tn).....	6-10		
Plastics, ABS			
What Engineers Should Know About ABS Plastics, by Robert F. McCabe.....	2-99		
Plastics, nylon			
Nylon Takes Tough Job From Die Steel (tn).....	6-9		
What Engineers Should Know About Nylon, by Donald D. Carswell.....	6-116		
Plastics, reinforced			
Reinforced Plastics at the World's Fair.....	5-110		
Reinforced Plastics in Cars and Trucks, by Fred L. Siegrist.....	5-105		
Plating			
Technology Forecast '64.....	1-67		
Polishing			
Giant Piston Rod Polished to Ultrasoother Finish (tn).....	6-9		
Powder metal compacts			
High Velocity Compaction of Iron Powder, by Eugene M. Stein, John R. Van Orsdel and Peter V. Schneider.....	4-83		
Hints on Heat Treating Parts of Powdered Iron, by Vernon Pryer.....	4-91		
How to Produce Complex Powder Parts Economically.....	5-118		
Impregnated Tungsten for Rocket Noz- zles, by Alfred Eisenlohr.....	4-94		
Iron Powder Parts . . . Their Processing and Evaluation, by Norbert K. Koebel and Russell F. Novy (d).....	2-156		
Plastic Impregnation of Powder Metal Parts, by N. B. Newcomb.....	4-88		
Powder Compactor Produces Large, Complex Shapes (tn).....	4-8		
Tungsten Granules Make Strong Sheet, by Daniel J. Maykuth, John L. Ratliff and Horace R. Ogden.....	6-109		
Powder metals			
Heat-Free Process Produces High Purity Powder (tn).....	6-9		
Presses			
How to Produce Complex Powder Parts Economically.....	5-118		
Powder Compactor Produces Large, Complex Shapes (tn).....	4-8		
Pressure vessels			
Pressure Vessels Formed at Cryogenic Temperatures (sr).....	4-124		
Quenching media			
Quenching Lean Alloys in Normal Oils, by Harold C. Stone.....	6-107		
Radiography			
Radiographing Hot Blooms, by A. Kohn (d).....	3-172		
Refractory materials			
Progress in Refractory Composites, by W. A. Gibeau and H. R. Ogden (d).....	4-100		
Refractory metals			
Materials and Processing . . . What Does the Aerospace Industry Need?, by Ralph G. Dermott.....	3-75		
Springboard to the Space Age: Better Ways to Fabricate New Materials.....	3-9		
Technology Forecast '64.....	1-67		
Working With Refractory Metals . . . Forming, by Robert C. Bertossa (d).....	3-138		
Joining, by Robert C. Bertossa (d).....	4-130		
Refractories			
New Refractory Resists Thermal Shock (tn).....	2-9		
Refrigeration			
Cooling Anodizing Baths, by Charles S. Cave (sr).....	5-120		
Resistance alloy			
Resistance Alloy Produced in Tubular Form (tn).....	3-7		

(aa) Atomic Age; (br) Book Review; (c) Correspondence; (cp) Critical Points; (d) Digest;
(ds) Data Sheet; (lm) Light Metallurgy; (sr) Short Runs; (tn) Technical News

Rockets		
Materials for the Ion Rocket, by Joseph M. Lamberti and Neal T. Saunders (d).....	3-191	
Rolling		
How to Roll Uranium, by N. Davies (d).....	5-182	
Steelmaker Studies New Rolling Method (tn).....	4-7	
Working With Refractory Metals Forming, by Robert C. Bertossa (d).....	3-138	
Rolls		
High Temperature Carburizing Users Like the Process Anvil Rolls, by Glenn O. Ratliff.....	5-78	
Rolls, by Lynn E. Arnold.....	5-77	
Sheet metal		
How Strong Is Molybdenum Sheet?, by Alan K. Hegedus.....	5-115	
Tungsten Granules Make Strong Sheet, by Daniel J. Maykuth, John L. Ratliff and Horace R. Ogden.....	6-109	
Silver alloys		
Brazing Faucets With Silver Alloy (sr).....	3-124	
Sintering		
Nitriding, Sintering and Brazing by Glow Discharge, by Claude K. Jones and Stuart W. Martin.....	2-94	
Soldering		
Induction Heating and Solder Injection Raise Tin Can Output (tn).....	5-9	
Spacecraft		
Electron Beam Welding of Large Structures, by William A. Wilson, P. Gordon Parks and Robert J. Schwinghamer.....	3-84	
The Impact of New Materials on Manufacturing.....	6-72	
Specifications		
Specifying Surface Finishes, by H. L. Seekins (d).....	5-150	
Springs		
Mechanical Properties of Beryllium Copper Wire and Springs, by Ronald D. Crooks and William R. Johnson.....	5-89	
Stainless steel		
The Impact of New Materials on Manufacturing.....	6-72	
A Japanese Stainless Steel With Acid Resistance, by F. Takamoto.....	1-107	
Nitriding, Sintering and Brazing by Glow Discharge, by Claude K. Jones and Stuart W. Martin.....	2-94	
Nitriding Today, by Wilson Leeming.....	2-86	
Pressure Vessels Formed at Cryogenic Temperatures (sr).....	4-124	
Technology Forecast '64.....	1-67	
Testing Small Tubing, by James D. Bean.....	4-102	
Welding Stainless Steel... Applications for Welded Structures, by Wayne L. Wilcox.....	6-96	
Statistics, production		
Metalworking Counts Up Big Year (tn).....	2-7	
Annealing Blackplate, by E. W. Williams (d).....	2-188	
Banding in Steel, by T. B. Smith, J. S. Thomas and R. Goodall (d).....	3-180	
Calcium Chloride Rusts Steel, by Joseph Geschelin (d).....	4-161	
Chromium Impregnated Steel... A New Muffler Material, by Bernard Trock and George W. Myrick.....	4-115	
Continuous Casting of Steel, by L. J. Gibson (d).....	3-168	
Hardness Conversion for Forged Steel Rolls, by Amos A. Bradd and William F. Shore.....	6-102; (ds) 6-104	
High Temperature Carburizing... the Process Works, by Walter E. Jominy.....	5-70	
How Aluminum Affects Steel, by L. A. Erasmus (d).....	6-192	
How Do Sulfur and Phosphorus Affect Cast Steel?, by C. G. Mickelson.....	1-84	
How Do You Test a Deep Drawing Steel?, by Gilles Pomey.....	5-95	
How Some Elements Affect Weldability, by H. V. Huxley (d).....	3-160	
New Nickel Plating Process for Improved Corrosion Resistance, by Richard K. Barnett.....	6-87	
Odd Structures in Carburized Steel, by Sten Gunnarson (d).....	4-150	
Restoring Carbon in Investment Castings of Steel, by John Hockin.....	4-79	
Seam-Free Steel Available in Large Diameter (tn).....	1-10	
Steel Firm Schedules Six Strand Mill and Tinning Line (tn).....	1-10	
Steelmaker Studies New Rolling Method (tn).....	4-7	
Strong Steels Trim Costs of Big Water Reservoir (tn).....	6-10	
Technology Forecast '64.....	1-67	
Testing Small Tubing, by James D. Bean.....	4-102	
Tin Coated Steel Foil Unveiled (tn).....	5-9	
A Versatile Chromium Diffusion Process, by A. L. Baldi.....	4-109	
Vinyl Coating Protects Steel Windows (sr).....	3-123	
Welding Ultrahigh Strength Steels, by R. E. Travis, V. P. Ardito and C. M. Adams, Jr. (d).....	5-181	
Steel, galvanized		
Weldability of Galvanized Steel Puzzles Automakers (tn).....	6-7	
Steel, maraging		
Evaluating Investment Castings of Maraging Steel, by Raymond J. Wilcox.....	1-87	
Features of Cast Maraging Steel, by J. B. Dabney and H. R. Larson (d).....	6-186	
How Hydrogen Affects Maraging Steel, by Hugh R. Gray and Alexander R. Troiano.....	4-75	
How Maraging Steel Transforms, by Donald M. Cheney.....	5-92	
Technology Forecast '64.....	1-67	
Welding 18% Ni Maraging Steel by Electron Beam, by Marvin L. Kohn and Charles D. Schaper.....	5-93	
Steelmaking, oxygen		
Using Basic Oxygen Steel in Europe, by Hubert O. Hauthmann.....	4-118	
Strain gages		
Strain Gages for Cryogenic Work, by Albert Kaufman (d).....	2-179	
Stress corrosion		
Materials and Processing... What Does The Aerospace Industry Need?, by Ralph G. Dermott.....	3-75	
Titanium Technology Focuses on Stress Corrosion (tn).....	3-7	
Tanks		
Big Seamless Bottles Store Liquid Helium (tn).....	2-7	
Liquid Methane Transported in Aluminum Tanks (tn).....	2-9	
Strong Steels Trim Costs of Big Water Reservoir (tn).....	6-10	
Tantalum		
Canada's Metallurgists Meet, by H. P. Tardif (d).....	4-174	
Tantalum alloys		
New Tantalum Alloy Aimed at Diverse Applications (tn).....	1-8	
Tempering		
Canada's Metallurgists Meet, by H. P. Tardif (d).....	4-174	
Testing		
How Do You Test a Deep Drawing Steel?, by Gilles Pomey.....	5-95	
Technology Forecast '64.....	1-67	
Testing Small Tubing, by James D. Bean.....	4-102	
Testing machines		
Bureau of Standards Orders Mammoth Testing Machine (tn).....	2-9	
Impact Testing With an Instrumented Machine, by H. P. Tardif and H. Marquis.....	2-79	
Thermocouple alloys		
Catalytic Thermocouple Alloys, by Lief O. Olsen (d).....	1-139	
Titanium		
Engineers Focus on... Fabrication in a Technical Age.....	4-9	
Technology Forecast '64.....	1-67	
Titanium Drum Keeps Maintenance Costs Low (tn).....	6-7	
Titanium alloys		
Hydrogen in Titanium, by D. N. Williams (d).....	3-154	
Heat Treatment and Fabrication of Wrought Titanium Alloys (ds).....	4-106	
Materials and Processing... What Does The Aerospace Industry Need?, by Ralph G. Dermott.....	3-75	
Properties, Specifications and Applications for Wrought Titanium Alloys (ds).....	3-106	
Titanium Technology Focuses on Stress Corrosion (tn).....	3-7	
Tool steel		
Technology Forecast '64.....	1-67	
Tool steel, high speed		
Cobalt in High Speed Steels, by F. R. Morral (d).....	6-150	
What Modified M2 Offers the User, by Gary Steven and Stanley J. Smialek.....	5-80	
Transformation		
How Maraging Steel Transforms, by Donald M. Cheney.....	5-92	
Transformation diagrams		
Cooling Transformation Diagram for AISI 4140.....	1-98; (ds) 1-100	
Cooling Transformation Diagram for AISI 43BV14.....	2-104; (ds) 2-106	
Tubing		
Ceramic Coating Extends Life of Thermocouple Tubes (tn).....	1-9	
Engineers Focus on... Fabrication in a Technical Age.....	4-9	
How Ductile Is Molybdenum Tubing?, by Laurence C. Shaheen.....	5-112	
Seamless Tubing Made From Re-50Mo Alloy (tn).....	2-10	
Teflon Film Protects Process Rolls (tn).....	6-10	
Testing Small Tubing, by James D. Bean.....	4-102	
Thin Walled Tubing Takes Tight Bends (tn).....	1-7	
Tube Bending Machine Gets Numerical Control (tn).....	1-9	
Tungsten		
Electron Beam Melting Tungsten, by Walter R. Witke, Earl C. Sutherland and Gordon K. Watson (d).....	4-186	
Impregnated Tungsten for Rocket Nozzles, by Alfred Eisenlohr.....	4-94	
New Developments in Manufacture of Electron Tubes, by Walter H. Kohl.....	5-83	
Porous Tungsten Floats on Water (tn).....	6-9	
Preparing Infiltrated Tungsten for Examination, by Robert E. Matt and Isamu Yoshioka.....	4-95	
Tungsten Foil Produced in Large Sizes (tn).....	1-8	
Tungsten Granules Make Strong Sheet, by Daniel J. Maykuth, John L. Ratliff and Horace R. Ogden.....	6-109	
Uranium		
How to Roll Uranium, by N. Davies (d).....	5-182	
Status of Gas Cooled Reactor Program, by Ray M. Evans and Allan E. Goldman.....	3-118	
Vacuum melting		
Big Vacuum Furnace Refines Degassed Metal (tn).....	1-9	
Vacuum arc melting		
Metallurgists Evaluate Improved Consumable Electrode Furnace (tn).....	5-10	
Weldability		
Weldability of Galvanized Steel Puzzles Automakers (tn).....	6-7	
Welding		
Engineers Focus on... Fabrication in a Technical Age.....	4-9	
Flux Cored Wire Speeds Welding of "T-1" (sr).....	2-121	
The Impact of New Materials on Manufacturing.....	6-72	
Technology Forecast '64.....	1-67	
Welding Columbium Alloys, by J. M. Gerken and J. M. Faulkner (d).....	5-161A	
Welding Stainless Steel... Applications for Welded Structures, by Wayne L. Wilcox.....	6-96	
Welding Ultrahigh Strength Steels, by R. E. Travis, V. P. Ardito and C. M. Adams, Jr. (d).....	5-181	
Wire Diameter in CO ₂ Welding, by A. A. Smith and S. A. Dye (d).....	4-162	
Welding, arc		
New Submerged Arc Flux for Inconel 82 Filler Metal (tn).....	6-8	
Welding, electron beam		
Electron Beam Welding of Large Structures, by William A. Wilson, P. Gordon Parks and Robert J. Schwinghamer.....	3-84	
Springboard to the Space Age: Better Ways to Fabricate New Materials.....	3-9	
Welding 18% Ni Maraging Steel by Electron Beam, by Marvin L. Kohn and Charles D. Schaper.....	5-93	

(aa) Atomic Age; (br) Book Review; (c) Correspondence; (cp) Critical Points; (d) Digest; (ds) Data Sheet; (lm) Light Metallurgy; (sr) Short Runs; (tn) Technical News

Welding, electroslag	
More on Electroslag Welding, by J. M. Stokes (c).....	6-124
Welders Look at Three New Processes, by Ralph G. Dermott.....	4-122

Welding, explosive	
Springboard to the Space Age: Better Ways to Fabricate New Materials.....	3-9

Welding, laser	
Welders Look at Three New Processes, by Ralph G. Dermott.....	4-122

Welds	
Microstructures Affect Weld Strength, by J. M. Wheatley and R. G. Baker (d).....	2-184

Western Metal and Tool Conference	
Engineers Focus on . . . Fabrication in a Technical Age.....	4-9

Wire	
Mechanical Properties of Beryllium Copper Wire and Springs, by Ronald D. Crooks and William R. Johnson.....	5-89
Wire Diameter in CO ₂ Welding, by A. A. Smith and S. A. Dye (d).....	4-162

Wiredrawing	
Proper Wiredrawing Improves Cold Heading, by Frank L. Gill and William M. Baldwin, Jr.....	2-83

Zinc	
Technology Forecast '64.....	1-67

Zinc alloys	
Zinc Research Aims at Auto Industry (tn).....	3-7

Zirconium alloys	
Canada's Metallurgists Meet, by H. P. Tardif (d).....	4-174

Author Index

Accountius, O. E. (c).....	1-112
Adams, C. M., Jr. (d).....	5-181
Alberts, F. E. (c).....	2-124
Ardito, V. P. (d).....	5-181
Arnold, Lynn E.....	5-77
Baker, R. G. (d).....	2-184
Baldi, A. L.....	4-109
Baldwin, William M., Jr.....	2-83
Barnett, Richard K.....	6-87
Bean, James D.....	4-102
Bertossa, Robert C. (d).....	3-138;
	(d) 4-130
Betz, R. A.....	1-91
Boes, D. J. (d).....	6-168
Bradd, Amos A.....	6-102; (ds) 6-104
Braski, David N. (d).....	6-182
Bruscato, R. (d).....	2-178
Butler, R. D. (d).....	6-138
Capus, J. M. (d).....	3-166
Carr, Frank L.....	2-74; 3-109
Carswell, Donald D.....	6-116
Cave, Charles S. (sr).....	5-120
Cheney, Donald M.....	5-92
Chyle, John J.....	6-94
Cina, B. (d).....	5-144
Colner, William H. (cp).....	5-69
Costanzo, Frank (d).....	4-180
Cottrell, A. H. (d).....	2-170
Cousland, S. McK. (d).....	6-176
Coutsouradis, D. (d).....	5-174
Crooks, Ronald D.....	5-89
Dabney, J. B. (d).....	6-186
Dashfield, Donald A.....	2-88
Davies, N. (d).....	5-182
Davin, A. (d).....	5-174
de Forest, Taber (c).....	6-126
Dennis, J. K. (d).....	2-177
Dennison, David L. (d).....	1-182
Dermott, Ralph G.....	3-75; 4-122
Drager, John.....	6-113
DuBeau, Normand P. (d).....	1-143
Dye, S. A. (d).....	4-162
Easterday, James R.....	5-78
Eisenlohr, Alfred.....	4-94
English, James L. (c).....	2-124
Erasmus, L. A. (d).....	6-192
Evans, R. M.....	3-118
Ewell, J. R.....	6-85
Faulkner, J. M. (d).....	5-161A
Field, Michael.....	6-80
Ford, D. A. (d).....	6-178
Fountain, Clifford W.....	4-97
Fox, Gerald F. P.....	1-103
Friebel, Virgil R. (c).....	3-126
Gerken, J. M. (d).....	5-161A
Geschelin, Joseph (d).....	4-161
Gibeaut, W. A. (d).....	4-190
Gibson, L. J. (d).....	3-168
Gill, Frank L.....	2-83
Goldman, Allan E.....	3-118
Goodall, R. (d).....	3-180
Gould, David S. (c).....	2-124
Gray, Allen G. (cp).....	1-83;
	(cp) 2-73; (cp) 3-73; (cp) 6-71
Gray, Hugh R.....	4-75
Gunnarson, Sten (d).....	4-150
Guy, A. G.....	2-117

Hahn, G. T. (d).....	5-177
Hautmann, Hubert O.....	4-118
Hegedus, Alan K.....	5-115
Hilliard, John E.....	5-99; (ds) 5-102
Hockin, John.....	4-79
Huxley, H. V. (d).....	3-160
Jacquet, P. A.....	2-114
Jaffee, R. I. (d).....	5-177
Jameson, Robert T.....	6-80
Janssen, J. H. (c).....	5-122
Johnson, R. F. (d).....	4-156
Johnson, William R.....	5-89
Jominy, Walter E.....	5-70
Jones, Claude K.....	2-94
Jones, Vernon O.....	4-97
Joshi, Kailash C. (c).....	3-126
Kaufman, Albert (d).....	2-179
Kienzle, Otto.....	6-172
Kleiner, Walter B. (d).....	3-148
Koebel, Norbert K. (d).....	2-156
Kohl, Walter H.....	5-93
Kohn, A. (d).....	3-172
Kohn, Marvin L.....	5-93
Krashes, David (d).....	6-134
Lamberg, Leonard J. (cp).....	4-73
Lamberti, Joseph M. (d).....	3-191
Landau, C. S. (d).....	5-164
Langenecker, Bertwin.....	4-97
Larson, Frank R.....	2-74; 3-109
Larson, H. R. (d).....	6-186
Lasday, S. B. (c).....	1-112
Leeming, Wilson.....	2-86
Lovering, E. W. (c).....	6-124
Manning, Charles R., Jr. (d).....	6-182
Marquis, H.....	2-79
Martin, George (c).....	5-122
Martin, Stuart W.....	2-94
Matlack, George L.....	3-114
Matt, Robert E.....	4-95
Maykuth, Daniel J.....	6-109
McCabe, Robert F.....	2-99
McGonnagle, Warren J. (d).....	5-130
Mear, D. R. (d).....	6-178
Michaelson, Gary.....	3-88
Mickelson, C. G.....	1-84
Minck, W. H. (d).....	6-156
Mondolfo, L. F. (d).....	2-178
Moreton, B. B. (d).....	6-138
Morrall, F. R. (d).....	6-150
Munse, W. H. (d).....	5-152
Murray, J. D. (d).....	4-156
Myrick, George W.....	4-115
Newcomb, N. B.....	4-88
Nielsen, H. P. (c).....	1-112;
	(c) 5-124
Novy, Russell F. (d).....	2-156
Ogden, Horace R. (d).....	4-190; 6-109
Okoshi, Makoto (d).....	6-196
Olcott, Joseph S. (d).....	1-141
Olsen, Lief O. (d).....	1-189
O'Neal, W. C.....	3-96
Palmisano, R. Richard.....	6-113
Parks, P. Gordon.....	3-84
Peterson, Jacob L.....	6-91
Pomey, Gilles.....	6-95

Porter, F. C. (d).....	1-95; 4-182
Pryer, Vernon.....	4-91
Push, H. L. D. (d).....	5-146
Ratliff, Glenn O.....	5-78
Ratliff, John L.....	6-109
Rhines, F. N.....	2-117
Rolfe, S. T. (d).....	5-152
Rosenberg, Samuel J. (c).....	3-126
Rosenblatt, Donald.....	5-79
Royster, Dick M. (d).....	6-182
Ryan, N. E. (d).....	5-164
Sargant, K. R. (d).....	6-176
Saunders, Neal T. (d).....	3-191
Schaper, Charles D.....	5-93
Schneider, Peter V.....	4-83
Schwinghamer, Robert J.....	3-84
Seekins, H. L. (d).....	5-150
Shaheen, Laurence C.....	5-112
Shore, William F.....	6-102;
	(ds) 6-104
Siegrist, Fred L.....	3-101; 5-105
Sikorski, M. E. (d).....	5-175
Sluhan, Clyde A. (d).....	5-166
Smialek, Stanley J.....	5-80
Smith, A. A. (d).....	4-162
Smith, R. M.....	6-91
Smith, T. B. (d).....	3-180
Stacy, John T.....	3-92
Staples, Elton E.....	5-74
Stein, Eugene M.....	4-83
Steven, Gary.....	5-80
Stokes, J. M. (c).....	6-124
Stone, Harold C.....	6-107
Strauss, Jerome (c).....	5-122
Such, T. E.....	2-177
Sullivan, John W. W. (c).....	6-126
Sundquist, B. E. (d).....	2-178
Sutherland, Earl C. (d).....	4-186
Tardif, H. P. (d).....	2-79; 4-174
Tesmen, Arthur B. (d).....	4-168
Thomas, J. S. (d).....	3-180
Topper, H. H. (d).....	6-178
Townsend, Lawrence E. (c).....	3-126
Travis, R. E. (d).....	5-181
Trock, Bernard.....	4-115
Troiano, Alexander R.....	4-75
Tsakamoto, F.....	1-107
Uhrus, L. O. (d).....	3-188
Uyehara, Kunio (d).....	6-196
Van Orsdel, John R.....	4-83
Wainerdi, Richard E. (d).....	1-143
Walter, J. L. (d).....	6-158
Watson, Gordon K. (d).....	4-186
Watson, S. A. (d).....	4-188
Weymueller, Carl R.....	2-109
Wheatley, J. M. (d).....	2-184
Wilcox, Raymond J.....	1-87
Wilcox, Wayne L.....	6-96
Williams, D. N. (d).....	3-154
Williams, E. W. (d).....	2-188
Wilson, D. V. (d).....	6-138
Wilson, William A.....	3-84
Witzke, Walter R. (d).....	4-186
Wood, W. A. (d).....	6-176
Yoshioka, Isamu.....	4-95
Zlatin, Norman.....	6-80

(na) Atomic Age; (br) Book Review; (c) Correspondence; (cp) Critical Points; (d) Digest; (ds) Data Sheet; (lm) Light Metallurgy; (sr) Short Runs; (tn) Technical News

METAL PROGRESS

THE MAGAZINE OF MATERIALS AND PROCESS ENGINEERING

Volume 86
June 1964 through December 1964

ALLEN G. GRAY, *Editor;*
Editor, Periodical Publications, ASM

RALPH G. DERMOTT, *Managing Editor*

CARL R. WEYMUELLER
Associate Editor

FRED L. SIEGRIST
Associate Editor

ELIZABETH M. ALDRICH
Assistant Editor

FLOYD E. CRAIG
Art Director



Metal Progress Is Owned and Published by
THE AMERICAN SOCIETY FOR METALS
Metals Park, Ohio

Subject Index

The subject headings used in this index are chosen in accordance with the ASM-SLA Metallurgical Literature Classification, International (Revised) Edition, published by the American Society for Metals, 1958.

- Aging**
Two-Step Aging of Al-Mg-Si Alloys, by Paul E. Fortin (sr) 5-119
- Agricultural equipment**
Trends in Applications for Stainless Steels . . . Agriculture 2-94
Why We Converted to Semi-Automatic Welding, by Warren Dean 5-98
- Aircraft**
Trends in Applications for Stainless Steels . . . Aircraft 2-82
Two Alloys for the SST—Stainless and Titanium, by D. N. Gideon, C. W. Marschall, F. C. Holden and W. S. Hyler (d) 2-206
What Vacuum Degassing Means to Users of Steels . . . the Aerospace Industry, by William C. Schulte 3-83
- Alloy steel**
AISI Standard Alloy Steel Compositions (Bars, Blooms, Billets and Slabs) (ds) 4-140
AISI Standard H-Steel Compositions (Bars, Blooms, Billets and Slabs) (ds) 5-108
Arc Remelting Improves Vacuum Degassed Steel (d) 3-178
The Changing Picture in Alloy Steels, by Carl R. Weymueller 4-138
Cooling Transformation Diagram for AISI 4340+Si 6-102; (ds) 6-104
Do You Consider Cold Drawn Alloy Steel?, by Robert Richmond 5-90
European Developments in High Alloy and Stainless Steels, by F. R. Morral (d) 2-188
Gears Are Made Stronger With Cold Treatment, by Lynn E. Arno'd 4-143
Hot Oil Quenching Reduces Gear Distortion, by John L. Yarnes 5-86; (e) 6-13
How Alloy Steels Are Used Today . . . in Automobiles, by Maurice F. Garwood 5-77
How Alloying Elements Affect Steel Deformation, by J. D. Crawford, R. G. Dunn and J. H. Humphrey (d) 4-262
How Fast Can You Weld Constructional Alloy Steels?, by Arthur F. Billy, William B. Blackburn and Roy C. Becker 4-152
Imparting Compressive Stresses to Surfaces of Through Hardened Steel, by D. P. Koistinen (d) 6-174
Materials for the Navy, by Robert C. Bertossa (d) 6-148
New Etchant Brings Out Grain Boundaries in Martensitic Steels, by Gary A. Dreyer, David E. Austin and W. Dianne Smith 1-116
A New Heat Treated Constructional Steel, by John C. Bomberger, Donald L. Freyberger and Edgar L. Fogleman 6-82
Strong Rotor Alloy for Turbine-Generators (tn) 2-7
Welded "T-1" Boom Sets New Mark (tn) 1-9
- Aluminum**
Aluminum Usage Climbs to New High (tn) 2-9
Analyzing Fractures in Aluminum, by Regis M. N. Pelloux (d) 5-175
Canadians String Aluminum Cable for High Voltage Transmission Line (tn) 1-9
Coating Aluminum, by R. D. Guminski and F. M. P. Meredith (d) 3-196
Interlocking Aluminum Extrusions Fabricated as Hangar Doors (tn) 1-10
More Machinable Steels, Copper and Aluminum Alloys 4-108
The Potential for Large Aluminum Die Castings, by Henry L. Byrne 4-197
- Aluminum alloys**
Dip Brazing of Aluminum, by Morgan Sinclair 3-84
Evaluating Aluminum Alloys by Non-destructive Tests, by Don Hagemeier and Rod Kleint 5-115
Fatigue in High Vacuum, by R. H. Christensen (d) 4-296
Materials for the Navy, by Robert C. Bertossa (d) 6-148
Two-Step Aging of Al-Mg-Si Alloys, by Paul E. Fortin (sr) 5-119
X7002: A New High Strength Weldable Aluminum Alloy, by Auvo I. Kempainen, W. Bernard Jenkins and George E. Stein 1-100
- Annealing**
Bright Annealing of Stainless Steel Tubing, by H. Bud Ahlquist 6-140
- Appliances**
Trends in Applications for Stainless Steels . . . Appliances and Utensils 2-87
- Ausforming**
English Duck With Ausforming, by W. E. Duckworth, P. R. Taylor and D. A. Leak (d) 1-164
- Austempering**
Austempering in Actual Practice, by Quentin D. Mehrkam 4-134
- Automobiles**
Electrocoating: A New Technique for Painting Auto Bodies 1-132
How Alloy Steels Are Used Today . . . in Automobiles, by Maurice F. Garwood 5-77
Trends in Applications for Stainless Steels . . . Autos and Trucks 2-81
- Bearings**
Controlling Carburizing Gases to Produce Quality Bearings, by O. W. McMullan (d) 4-240
Bearings for High Temperature Use, by Edmond E. Bisson and William J. Anderson (d) 1-148
Powder Metal + Solid Lubricant = A New Bearing Material, by Jan W. Van Wyk 3-101
A "Stainless High Speed" Steel for Aerospace Applications, by Birger L. Johnson 3-116
Welding Ball Bearing Retainers (sr) 1-119
What Vacuum Degassing Means to Users of Steels . . . the Bearing Manufacturer, by Charles E. Norton 3-83
- Bend test**
A Simple Test for Hydrogen Embrittlement, by William O. Allread and George H. Robinson 5-102
- Beryllium**
Beryllium Torque Tubes Save Weight in the F-111 (tn) 5-8
- Beryllium alloys**
Beryllium Copper Springs, by Ronald D. Crooks (e) 1-136
Ductile Beryllium Comes in View, by Richard Schmidt 6-132
Formable Be-Al Alloy Nears Full Scale Production (tn) 3-9
Materials for the Navy, by Robert C. Bertossa (d) 6-148
- Brass**
Copper and Brass Producer Adds New Mill Equipment (tn) 6-7
Embrittlement in Cartridge Brass, by C. C. Koch and A. R. Troiano (d) 4-290
- Brazing**
Brazing Holds Close Tolerances in Electron Tubes (sr) 3-124
Dip Brazing of Aluminum, by Morgan Sinclair 3-84
- Bridges**
Custom Built Extensometer Heals Salvage Bridge, by Elwood Norri. (sr) 5-119
- Buildings**
Trends in Applications for Stainless Steels . . . Architecture 2-86
- Cable**
Canadians String Aluminum Cable for High Voltage Transmission Line (tn) 1-9
- Cable sheath**
Composite Sheath Protects Electrical Cable (tn) 3-8
- Carbides**
Titanium Carbide Coating Extends Life of Tools and Dies (tn) 3-10
- Carbon steel**
Austempering in Actual Practice, by Quentin D. Mehrkam 4-134
How to Heat Treat Carbon Steels, by Raymond H. Hays 4-128
New Series of Strong Carbon Steels for Heavy Structures (tn) 2-9
Strengthening Low Carbon Steel, by E. T. Stephenson, G. H. Karchner and Philip Stark (d) 6-182
- Carbon yarn**
Carbon Yarn Produced by Continuous Process (tn) 2-8
- Carburizing**
Carburizing Furnace Gives Close Carbon Control, by Carl R. Weymueller (d) 5-154
Carburizing Steel Formulated for Heavy Duty Applications (tn) 3-10
Controlling Carburizing Gases to Produce Quality Bearings, by O. W. McMullan (d) 4-240
- Casting**
How to Process 17-4 PH Stainless Steel Castings, by Richard J. Dvorak and John C. Frits 2-174
Using Computers in Casting Technology, by John Zotos (d) 3-196
- Casting, continuous**
A Consumer Looks at Continuously Cast Steel, by Donald J. Wulpi 6-72
How Good Are Continuously Cast Steels?, by Allen G. Gray (cp) 6-71
- Cast iron**
Austempering in Actual Practice, by Quentin D. Mehrkam 4-134
Study Sets Guidelines for Machining Malleable Iron (tn) 6-7
- Ceramic coatings**
Flame Sprayed Nickel Aluminide Coatings . . . How and Where to Use Them, by Daniel H. Sitzer 3-128
- Chain**
A New Heat Treating Line for Coal Mining Equipment, by Carroll P. Little and Paul A. Williams 3-88
- Chemical processing**
Trends in Applications for Stainless Steels . . . Chemical Processing 2-83
- Cladding**
Aluminum Bronze and Hastelloy Clad to Steel for Tube Sheet (tn) 6-8
Cladding Wire Continuously, by J. G. Kura (d) 4-271
- Cleaning**
Lower Cost Descaling for Steel Strip (tn) 5-9
- Coatings**
Coated Refractory Metals, by W. A. Gibeau and E. S. Bartlett (d) 3-199
Coating Aluminum, by R. D. Guminski and F. M. P. Meredith (d) 3-196
Progress in High Temperature Technology . . . Newer Materials, by Robert C. Bertossa (d) 2-212
Sprayed Polyurethane Coats Tanks With Corrosion Resistant Film (tn) 2-10
Titanium Carbide Coating Extends Life of Tools and Dies (tn) 3-10
- Cobalt**
Properties and Applications of Cobalt Strip, by Robert W. Fraser and David J. I. Evans and Vladimir N. Mackiw 1-80
- Cold forming**
What Vacuum Degassing Means to Users of Steels . . . Cold Formers, by Herman F. Hiller and Willard Rubin. 3-81
- Cold treatment**
Gears Are Made Stronger With Cold Treatment, by Lynn E. Arnold 4-143
- Composite materials**
Reinforcing Materials With Fibers, by A. Kelly (d) 6-184
Using Filaments and Whiskers, by H. J. Wagner (d) 6-176
- Computers**
Computers Control New Oxygen Steel Furnaces (tn) 1-8
Fast Process Computer Unveiled (tn) 3-7
Using Computers in Casting Technology, by John Zotos (d) 3-196
- Constructional steel**
How Fast Can You Weld Constructional Alloy Steels?, by Arthur F. Billy, William B. Blackburn and Roy C. Becker 4-152

(c) Correspondence; (cp) Critical Point; (d) Digest; (ds) Data Sheet; (sr) Short Runs; (tn) Technical News

A New Heat Treated Constructional Steel, by John C. Bomberger, Donald L. Freyberger and Edgar L. Fogleman	6-82
Working With Constructional Steels, by Carl R. Weymueller	3-148
Controlled atmosphere	
Carburizing Furnace Gives Close Carbon Control, by Carl R. Weymueller (d)	5-154
Copper	
Copper and Brass Producer adds New Mill Equipment (tn)	6-7
Drawing Quality Steel Preplated With Copper (tn)	6-10
More Machinable Steels, Copper and Aluminum Alloys	4-108
Sulfur in Copper, by Matti J. Saari-virta (d)	4-296
Copper alloys	
Larger Powder Parts for Structural Applications, by H. Arthur Wormet	4-216
Machining Heat Treatable Copper Alloys, by Malcolm Buell and Milton Scully (d)	6-187
Corrosion	
What Weld Metal for Type 316L Stainless Steel?, by R. Harry Espy	3-109
Deformation	
How Alloying Elements Affect Steel Deformation, by J. D. Crawford, R. G. Dunn and J. H. Humphrey (d)	4-262
Die castings	
The Potential for Large Aluminum Die Castings, by Henry L. Byrne	4-197
Dies	
What Vacuum Degassing Means to Users of Steels . . . the Tool and Die-maker, by Theodore A. Ledin	3-82
Diffusion	
Progress in High Temperature Technology . . . Newer Materials, by Robert C. Bertossa (d)	2-212
Distortion	
Hot Oil Quenching Reduces Gear Distortion, by John L. Yarne	5-86; (d) 6-13
Drawing	
Do You Consider Cold Drawn Alloy Steel?, by Robert Richmond	5-90
Drawing, deep	
Drawability of Type 301 Stainless, by C. Kenneth Divers	2-115
Drawability of Type 301 Stainless . . . Statistical Design to Determine Drawability, by C. Kenneth Divers	2-116
Editorial	
Accent on Stainless, by Allen G. Gray (cp)	2-73
How Good Are Continuously Cast Steels?, by Allen G. Gray (cp)	6-71
Manufacturing Wakes Up to Modern Technology, by Allen G. Gray (cp)	1-78
No Time for Complacency, by Allen G. Gray (cp)	4-107
Progress Toward Better Steels, by Allen G. Gray (cp)	3-73
Why Alloy Steel Specifications Continually Change, by Andrew N. Hoover (cp)	5-75
Elastic properties	
Controlling Spring Back in Forming Stainless, by Edward L. Fowler and John J. Moran	2-111
Electroforming	
Electroforming With Nickel . . . A Versatile Production Technique, by Fred L. Siegrist	5-121
Have You Considered Electroforming?, by Fred L. Siegrist	4-219
Electronic equipment	
Brazing Holds Close Tolerances in Electron Tubes (sr)	3-124
Electron microscopy	
Magnetic Domains Viewed in Electron Microscope (tn)	3-8
Electroplating	
Electroplating Titanium, by William B. Harding (d)	1-167
How to Electroplate Plastic Parts, by J. Burk McNamara	1-112
Improved Process Specifications for Plated Parts, by William B. Harding	4-156
New Process for Electroplaters (tn)	1-7
Nickel Platers Trim Costs With Titanium Baskets (sr)	1-118
Embrittlement	
Embrittlement in Cartridge Brass, by C. C. Koch and A. R. Troiano (d)	4-290
Hydrogen in Water Embrittles Steel, by G. L. Hanna, A. R. Troiano and E. A. Steigerwald (d)	6-166
Preventing Sigma Phase Embrittlement in Nickel Base Superalloys, by William J. Boesch and John S. Slaney	1-109
A Simple Test for Hydrogen Embrittlement, by William O. Allread and George H. Robinson	5-102
Extrusion, cold	
Case Histories in Cold Extrusion, by Ralph G. Dermott	4-118
Cold Extrusion From the Practical Side, by R. A. P. Morgan	4-124
Fasteners	
Small Nylon Strip Anchors Self-Locking Screw (tn)	6-9
Trends in Applications for Stainless Steels . . . Fasteners	2-89
Fatigue	
Fatigue in High Vacuum, by R. H. Christensen (d)	4-296
Studying Fatigue in Metals, by A. J. McEvily, Jr., R. C. Boettner, C. Laird and C. E. Feltnier (d)	4-260
Finishing	
Finishing Stainless Steel, by Ernest S. Kopecki	2-152
Flame coating	
Flame Sprayed Nickel Aluminide Coatings . . . How and Where to Use Them, by Daniel H. Sitzer	3-128
Flame cutting	
Efficient Flame Cutter Reduces Production Time (tn)	6-9
Flame hardening	
Flame Hardening Extends Life of Railroad Track (tn)	1-10
Food processing equipment	
Trends in Applications for Stainless Steels . . . Food Processing	2-99
Forging	
What Vacuum Degassing Means to Users of Steels . . . Drop and Press Forgers, by Raymond Blom	3-82
Formability	
Drawability of Type 301 Stainless, by C. Kenneth Divers	2-115
Drawability of Type 301 Stainless . . . Statistical Design to Determine Drawability, by C. Kenneth Divers	2-116
Forming	
Case Histories in Cold Extrusion, by Ralph G. Dermott	4-118
Cold Extrusion From the Practical Side, by R. A. P. Morgan	4-124
Controlling Spring Back in Forming Stainless, by Edward L. Fowler and John J. Moran	2-111
Electromagnetic Forming Aids Heat Shrinking (tn)	3-9
Foundry practice	
How to Process 17-4 PH Stainless Steel Castings, by Richard J. Dvorak and John C. Fritz	2-174
Fracture	
Analyzing Fractures in Aluminum, by Regis M. N. Pelloux (d)	5-175
Heat Treating Welds in Austenitic Stainless, by R. N. Younger, D. M. Haddrell and R. G. Baker (d)	2-203
Free-machining steels	
Rating the Performance of Free-Machining Steels, by Donald W. Murphy	1-85
Furnaces	
Carburizing Furnace Gives Close Carbon Control, by Carl R. Weymueller (d)	5-154
Giant Car Bottom Furnace Stress Relieves Welded Structures (tn)	6-8
Gage blocks	
Stable Gage Blocks, by Melvin R. Meyerson and Marcos C. Sola (d)	4-292
Galvanized steel	
Choose the Right Zinc Coating for Large Structures, by John R. Daemen	3-95
Where to Use Galvanized and Aluminum Coated Steel Sheets, by Kenneth G. Coburn	4-184
Gas plating	
Plating With Gas, by Charles E. MacNeill (d)	3-200
Gears	
Cast Nylon Gear Takes Heavy Shock Loads (tn)	2-9
Gears Are Made Stronger With Cold Treatment, by Lynn E. Arnold	4-143
Hot Oil Quenching Reduces Gear Distortion, by John L. Yarne	5-86; (c) 6-13
Gold plating	
Soldering to Gold Plate, by W. B. Harding and H. B. Pressly (d)	1-156
Grinding	
Hot Grinding Accelerates Metal Removal Rates (tn)	3-8
Hardening, case	
Case Hardening Doubles Strength of Diesel Crankshafts (tn)	2-10
Hardening, dispersion	
Progress in High Temperature Technology . . . Newer Materials, by Robert C. Bertossa (d)	2-212
Recrystallization in Dispersion Hardened Nickel, by M. C. Inman, K. M. Zwilsky and D. H. Boone (d)	5-173
Hardness conversions	
A Question About Hardness Conversions, by J. R. Keeler; Author's Reply, by Amos A. Bradd and David G. Yorke (c)	5-13
Heat resisting alloys	
NASA Plans Tests on Welded René 41 Sandwich Structure (tn)	3-10
Recommended Procedures for Turning Superalloys, by Carl T. Olofson (ds)	1-106
Structures in Superalloys, by S. T. Wlodke (d)	4-284
Turning Superalloys, by Carl T. Olofson	1-104
Heat resisting materials	
Progress in High Temperature Technology . . . Newer Materials, by Robert C. Bertossa (d)	2-212
Heat treatment	
Austempering in Actual Practice, by Quentin D. Mehrkam	4-134
Heat Treating Truck Parts in a Modern Plant, by Richard A. Grayson	1-75
How to Heat Treat Carbon Steels, by Raymond H. Hays	4-128
A New Heat Treating Line for Coal Mining Equipment, by Carroll P. Little and Paul A. Williams	3-88
High strength steel	
Materials for the Navy, by Robert C. Bertossa (d)	6-148
Hospital equipment	
Trends in Applications for Stainless Steels . . . Hospitals and Laundries	2-98
Hydrogen	
Hydrogen in Stainless Steel, by D. A. Vaughan and D. I. Phalen (d)	4-288
Inclusions	
Counting Inclusions Electronically, by R. A. Bloom, H. Walz and J. G. Koenig (d)	1-162
How to Extract Inclusions From Specimens, by Robert E. Brien (d)	5-176
Induction heating	
Induction Heating Speeds Cylinder Production (sr)	1-118
Industrial equipment	
How Alloy Steels Are Used Today . . . in Industrial Equipment, by Harold A. Maloney	5-82
Iron alloys	
Iron-Aluminum Alloys . . . a New Group Appears, by John J. Mueller	3-158
Larger Powder Parts for Structural Applications, by H. Arthur Wormet	4-216
Strengthening Iron-Nickel Alloys, by C. M. Hammond and G. S. Ansell (d)	6-167
Lattice formation	
Behavior of Lattices, by Niels Engel (d)	4-256
Lubricants	
High Temperature Lubricant Dispensed From Aerosol Packages (tn)	2-10
Powder Metal + Solid Lubricant = A New Bearing Material, by Jan W. Van Wyk	3-101

(c) Correspondence; (cp) Critical Point; (d) Digest; (ds) Data Sheet; (sr) Short Runs; (tn) Technical News

Machinability

- Improved Processing With Free-Machining Stainless, by Samuel E. Tyson and Charles A. Divine, Jr. 5-111
- Machinability of Leadless Stainless, by Norman L. McClymonds 2-166

Machining

- Machining Heat Treatable Copper Alloys, by Malcolm Buell and Milton Scully (d) 6-187
- Machining of Stainless Steel, by Deo M. Blott 2-119
- More Machinable Steels, Copper and Aluminum Alloys 4-108
- Rating the Performance of Free-Machining Steels, by Donald W. Murphy 1-85
- Study Sets Guidelines for Machining Malleable Iron (tn) 6-7

Magnesium alloys

- The Lightest Commercial Alloy, by Elliott Willner (d) 4-254

Maraging steel

- European Developments in High Alloy and Stainless Steels, by F. R. Morral (d) 2-188
- Hardening of Maraging Steels, by S. Floren (d) 6-178
- Maraging Steel Motor Case Passes Firing Test (tn) 2-8
- Martensite in Maraging Steels, by R. B. G. Yeo (d) 6-164
- Progress in Maraging Steels (tn) 6-7
- Properties of Maraging Steels, by S. Floren and G. R. Speich 4-268

Materials Application Competition

- New Ideas in Materials and Processing 6-107

Melting, arc

- Arc Remelting Improves Vacuum Degassed Steel (d) 3-178

Metallizing

- Bright Future for Vacuum Metallizing, by Philip J. Clough and John V. E. Hansen 5-93
- Thick Films: Promising Prospect for Vacuum Metallizing, by Philip J. Clough and John V. E. Hansen 6-78

Metallographic exhibit

- Decomposition of NiC at High Pressure and Temperature 6-117

Metallurgy

- Evaluating Coated Particles of Nuclear Fuel, by Robert W. McClung, E. Sloan Bomar and Robert J. Gray 1-90
- New Etchant Brings Out Grain Boundaries in Martensitic Steels, by Gary A. Dreyer, David E. Austin and W. Dianne Smith 1-116

Metal spraying

- Flame Sprayed Nickel Aluminide Coatings . . . How and Where to Use Them, by Daniel H. Sitzler 3-128

Metric system

- Industry Views the Metric System 6-98
- Our Stake in the English System 6-95
- Why I Favor the Metric System, by Elton E. Staples 6-93

Microradiography

- Evaluating Coated Particles of Nuclear Fuel, by Robert W. McClung, E. Sloan Bomar and Robert J. Gray 1-90

Military equipment

- How Alloy Steels Are Used Today . . . in Army Vehicles, by Charles J. Kropf 5-80

Mining equipment

- Trends in Applications for Stainless Steels . . . Mining 2-95

Molybdenum

- Consolidating Metal Powders Magnetically, by Donald J. Sandstrom 3-91
- Molybdenum and Continuous Transformation, by R. V. Postini and M. Semchyshen (d) 4-294
- Uniform Properties in Molybdenum Sheet Reduce "Ears" on Formed Parts (tn) 1-10

Molybdenum alloys

- Everyday Uses for Molybdenum, by Robert R. Freeman 4-161

Motors

- How Alloy Steels Are Used Today . . . in Outboard Motors, by John Longbaugh 5-23

National Metal Congress

- Innovations Spark 1964 Metals/Materials Show (tn) 5-7

Nickel

- Electroforming With Nickel . . . A Versatile Production Technique, by Fred L. Siegrist 5-121
- Recrystallization in Dispersion Hardened Nickel, by M. C. Inman, K. M. Zwilsky and D. H. Boone (d) 5-173

Nickel alloys

- Have You Considered Electroforming?, by Fred L. Siegrist 4-219
- Minimum Properties Specified for Inconel Alloy 718 (tn) 3-9
- Nickel Base Alloy Resists Attack by Sulfuric and Phosphoric Acids (tn) 3-8
- Preventing Sigma Phase Embrittlement in Nickel Base Superalloys, by William J. Boesch and John S. Slaney 1-109
- Recommended Procedures for Turning Superalloys, by Carl T. Olofson (ds) 1-106
- Turning Superalloys, by Carl T. Olofson 1-104

Nickel aluminide

- Flame Sprayed Nickel Aluminide Coatings . . . How and Where to Use Them, by Daniel H. Sitzler 3-128

Nickel plating

- Nickel Platers Trim Costs With Titanium Baskets (sr) 1-118
- Producing "Satin" Nickel Plates, by T. W. Tomaszewski, R. J. Claus and H. Brown (ds) 3-182

Nondestructive testing

- Counting Inclusions Electronically, by R. A. Bloom, H. Walz and J. G. Koenig (d) 1-162
- Evaluating Aluminum Alloys by Nondestructive Tests, by Don Hagemeyer and Rod Kleint 5-115
- Materials for the Navy, by Robert C. Bertossa (d) 6-148

Nuclear reactors, fuel elements

- Evaluating Coated Particles of Nuclear Fuel, by Robert W. McClung, E. Sloan Bomar and Robert J. Gray 1-90

Painting

- Electrocoating: A New Technique for Painting Auto Bodies 1-132

Petroleum industry

- Trends in Applications for Stainless Steels . . . Petroleum and Petrochemical 2-98

Pipe

- Corrosion Resistant Coupling Joins Pipe Sections (tn) 1-9
- Thin Wall Pipe Produced in 80 Ft Lengths (tn) 3-8

Plasma processing

- Plasma Spraying of Tungsten and Zirconia, by Salvatore J. Grisaffe and William A. Spitzig (d) 1-166
- Steelmaker Installs Plasma Arc Welding in Stainless Tube Mill (tn) 1-8
- Welding by Plasma Arc, by R. L. O'Brien (d) 4-260

Plastics

- How Plastics Standards Are Used at Chrysler, by Ernest J. Storf 6-123
- How Specifications for Thermoplastics Are Applied at Ford 4-146
- How to Electroplate Plastic Parts, by J. Burk McNamara 1-112
- What Engineers Should Know About Standards for Plastics, by J. B. De Coste 6-131

Plastics, nylon

- Cast Nylon Gear Takes Heavy Shock Loads (tn) 2-9
- Properties and Fabrication of the Nylons, by Donald D. Carswell 1-94

Powder metal compacts

- Consolidating Metal Powders Magnetically, by Donald J. Sandstrom 3-91
- Larger Powder Parts for Structural Applications, by H. Arthur Wormet 4-216
- Permeability of Tungsten Matrices, by Allen T. Robinson (d) 5-158
- Powder Metal + Solid Lubricant = A New Bearing Material, by Jan W. Van Wyk 3-101
- Properties and Applications of Cobalt Strip, by Robert W. Fraser, David J. I. Evans and Vladimir N. Mackiw 1-80

Power plants

- Trends in Applications for Stainless Steels . . . Power Generation 2-85

Precipitation hardening

- Precipitation Hardening Phenomena, by E. Hornbogen (d) 4-272
- Strengthening Iron-Nickel Alloys, by C. M. Hammond and G. S. Ansell (d) 6-167

Quenching

- Hot Oil Quenching Reduces Gear Distortion, by John L. Yarne 5-86; (c) 6-13

Railroad cars

- How Alloy Steels Are Used Today . . . in Locomotives, by Samuel R. Callaway 5-83
- Trends in Applications for Stainless Steels . . . Railway Equipment 2-97
- Trends in Applications for Stainless Steels . . . Subway and Commuter Cars 2-80

Refractories

- Applications for Silicon Carbide Refractories, by David B. Herbert 6-87

Refractory metals

- Coated Refractory Metals, by W. A. Gibeaut and E. S. Bartlett (d) 3-199
- Diboride Coating Prolongs Life of Refractory Metals (tn) 5-9
- Infab Rolls Difficult Shapes in Refractory Metal Bars (tn) 6-8
- Materials for the Navy, by Robert C. Bertossa (d) 6-148

Residual stresses

- Imparting Compressive Stresses to Surfaces of Through Hardened Steel, by D. P. Koistinen (d) 6-174

Rockets

- Progress in High Temperature Technology . . . Newer Materials, by Robert C. Bertossa (d) 2-212
- Welding Titanium . . . How to Weld Ti-6Al-4V Rocket Cases, by George L. Vonnegut, George R. Sippel and Dean K. Hanink 3-119

Roll forming

- Roll Forming of Stainless Strip 2-170

Rolling

- Copper and Brass Producer Adds New Mill Equipment (tn) 6-7
- Infab Rolls Difficult Shapes in Refractory Metal Bars (tn) 6-8
- Properties and Applications of Cobalt Strip, by Robert W. Fraser, David J. I. Evans and Vladimir N. Mackiw 1-80
- Strengthening Stainless Steel by Rolling, by S. Floren and G. W. Tuffnell (d) 5-169
- Type 316 Stainless Steel Rolled to Tight Thickness Tolerance (tn) 6-10

Sandwich structures

- NASA Plans Tests on Welded René 41 Sandwich Structure (tn) 3-10

Seals

- Seals for High Temperature Use, by R. S. Kiwak (d) 4-250

Ships

- Materials for the Navy, by Robert C. Bertossa (d) 6-148
- Trends in Applications for Stainless Steels . . . Ships and Boats 2-95

Soldering

- Soldering to Gold Plate, by W. B. Harding and H. B. Pressly (d) 1-155

Spacecraft

- Progress in High Temperature Technology . . . Newer Materials, by Robert C. Bertossa (d) 2-212
- Trends in Applications for Stainless Steels . . . Space Vehicles 2-91

Specifications

- ASTM Standards Through the Years, by J. W. Caum and H. J. Stremba (d) 6-185
- How Plastics Standards Are Used at Chrysler, by Ernest J. Storf 6-123
- How Specifications for Thermoplastics Are Applied at Ford 4-146
- Improved Process Specifications for Plated Parts, by William B. Harding 4-156
- What Engineers Should Know About Standards for Plastics, by J. B. De Coste 5-131
- Why Alloy Steel Specifications Continually Change, by Andrew N. Hoover (cp) 5-75

(c) Correspondence; (cp) Critical Point; (d) Digest; (ds) Data Sheet; (sr) Short Runs; (tn) Technical News

Stainless steel

- Bright Annealing of Stainless Steel Tubing, by H. Bud Ahlquist 6-140
Case Histories in Cold Extrusion, by Ralph G. Dermott 4-118
Controlling Spring Back in Forming Stainless, by Edward L. Fowler and John J. Moran 2-111
Drawability of Type 301 Stainless, by C. Kenneth Divers 2-115
European Developments in High Alloy and Stainless Steels, by F. R. Morral (d) 2-188
Finishing Stainless Steel, by Ernest S. Kopecki 2-162
Heat Treating Welds in Austenitic Stainless, by R. N. Younger, D. M. Haddrell and R. G. Baker (d) 2-203
How to Process 17-4 PH Stainless Steel Castings, by Richard J. Dvorak and John C. Fritts 2-174
Hydrogen in Stainless Steel, by D. A. Vaughan and D. I. Phalen (d) 4-288
Improved Processing With Free-Machining Stainless, by Samuel E. Tyson and Charles A. Divine, Jr. 5-111
Machinability of Lead Stainless, by Norman L. McClymonds 2-166
Machining of Stainless Steel, by Deo M. Blott 2-119
A Precipitation Hardening Stainless Steel, by D. C. Perry and M. W. Marshall (d) 2-200
Roll Forming of Stainless Strip 2-170
A "Stainless High Speed" Steel for Aerospace Applications, by Birger L. Johnson 3-116
Stainless Steel Condenser Tubes Carry Salt Water Coolant (tn) 6-8
Strengthening Stainless Steel by Rolling, by S. Floren and G. W. Tuffnell (d) 5-162
Stress Relief of Austenitic Stainless Steels, by G. Stanley Sangdahl 2-100
Trends in Applications for Stainless Steels 2-78
Two Alloys for the SST—Stainless and Titanium, by D. N. Gideon, C. W. Marshall, F. C. Holden and W. S. Hyler (d) 2-206
Type 316 Stainless Steel Rolled to Tight Thickness Tolerance (tn) 6-10
Typical Properties and Applications for Wrought Stainless Steel (d) 2-108
Welding the Newer Grades . . . AM-350, AM-355, AM-363 and the Muffler Alloys, by R. H. Kaltenhauser 2-125
Welding the Newer Grades . . . PH Alloys and Manganese Stainless Steel, by R. Harry Eppy 2-130
Welding Stainless Steel—The 200 and 300 Series, by Wayne L. Wilcox 1-121
Welding Stainless Steel . . . The 400 Series, by Wayne L. Wilcox 2-140
What Users Think of Stainless Steels 2-74
What Weld Metal for Type 316L Stainless Steel?, by R. Harry Eppy 3-109

Standard steels

- AISI Standard Alloy Steel Compositions (Bars, Blooms, Billets and Slabs) (ds) 4-140
AISI Standard H-Steel Compositions (Bars, Blooms, Billets and Slabs) (ds) 5-108
The Changing Picture in Alloy Steels, by Carl R. Weymueller 4-138

Steel

- Carburizing Steel Formulated for Heavy Duty Applications (tn) 3-10
Case Histories in Cold Extrusion, by Ralph G. Dermott 4-118
Cast Steel Crane Hooks Handle Heavy Steel Mill Loads (tn) 6-9
Cold Extrusion From the Practical Side, by R. A. P. Morgan 4-124
Columbium in Heat Resistant Steel, by R. M. Goldhoff and H. J. Beattie, Jr. (d) 5-181
A Consumer Looks at Continuously Cast Steel, by Donald J. Wulpi 6-72
Drawing Quality Steel Preplated with Copper (tn) 6-10
Electroslag Welds Join Thick HY 80 Plates, by Richard S. Rote 5-142
Four Steels Augment List of Constructional Grades (tn) 1-7
Heat Treating Truck Parts in a Modern Plant, by Richard A. Grayson 1-75
How Good Are Continuously Cast Steels?, by Allen G. Gray (cp) 6-71
Hydrogen in Water Embrittles Steel, by G. L. Hanna, A. R. Troiano and E. A. Steigerwald (d) 6-166
Improved Process Specifications for Plated Parts, by William B. Harding 4-156
Lower Cost Descaling for Steel Strip (tn) 5-9
More Machinable Steels, Copper and Aluminum Alloys 4-108
A New Heat Treating Line for Coal Mining Equipment, by Carroll P. Little and Paul A. Williams 3-88
A Question About Hardness Conversions, by J. R. Keeler; Author's Reply,

- by Amos A. Bradd and David G. York (c) 5-13
A Simple Test for Hydrogen Embrittlement, by William O. Allread and George H. Robinson 5-102
Steel Output Heads for New Mark (tn) 3-7
Thick Films: Promising Prospect for Vacuum Metallizing, by Philip J. Clough and John V. E. Hansen 6-78
Two Steel Mills Share Output of Large Oxygen Plant (tn) 6-10
Vacuum Degassing: Key to Better Steels, by Carl R. Weymueller 3-74
What Vacuum Degassing Means to Users of Steels 3-81
Where to Use Galvanized and Aluminum Coated Steel Sheets, by Kenneth G. Coburn 4-184
Why We Converted to Semi-Automatic Welding, by Warren Dean 5-98

Steel, maraging

- European Developments in High Alloy and Stainless Steels, by F. R. Morral 2-188
Hardening of Maraging Steels, by S. Floren (d) 6-178
Maraging Steel Motor Case Passes Firing Test (tn) 2-8
Martensite in Maraging Steels, by R. B. G. Yeo (d) 6-164
Progress in Maraging Steels (tn) 6-7
Properties of Maraging Steels, by S. Floren and G. R. Speich 4-268

Steelmaking

- New Precision for Steel Production (tn) 6-10
Computers Control New Oxygen Steel Furnaces (tn) 1-6

Stress corrosion

- Stress Corrosion of Metals, by Hugh L. Logan (d) 4-272
Stress Relief of Austenitic Stainless Steels, by G. Stanley Sangdahl 2-100

Stress relief

- Giant Car Bottom Furnace Stress Relieves Welded Structures (tn) 6-8

Sulfur

- Sulfur in Copper, by Matti J. Saarivirta (d) 4-296

Tanks

- Sprayed Polyurethane Coats Tanks With Corrosion Resistant Film (tn) 2-10

Textile machinery

- Trends in Applications for Stainless Steels . . . Textile Machinery 2-90

Tin plate

- Tin Coating Outshines Paint on Steel Ironing Board Legs (tn) 5-8

Titanium

- Anisotropy in Titanium, by Frank R. Larson (d) 5-181
Electroplating Titanium, by William B. Harding (d) 1-167
Materials for the Navy, by Robert C. Bertossa (d) 6-148

Titanium alloys

- The Future of Titanium in Everyday Uses, by Ward W. Minkler 4-170
Two Alloys for the SST—Stainless and Titanium, by D. N. Gideon, C. W. Marshall, F. C. Holden and W. S. Hyler (d) 2-206
Welding Titanium . . . How to Weld Ti-6Al-4V Rocket Cases, by George L. Vonnegut, George R. Sippel and Dean K. Hanink 3-119

Tools

- What Vacuum Degassing Means to Users of Steels . . . The Tool and Die-maker, by Theodore A. Ledin 3-82

Transformation

- Molybdenum and Continuous Transformation, by R. V. Fostini and M. Semchyshen (d) 4-294
Progress in High Temperature Technology . . . Newer Materials, by Robert C. Bertossa (d) 2-212

Transformation diagrams

- Cooling Transformation Diagram for AISI 4340 3-104; (ds) 3-106
Cooling Transformation Diagram for AISI 4340+Si 6-102; (ds) 6-104

Trucks

- Ford Turbine Truck Hits the Road (tn) 5-9
Heat Treating Truck Part in a Modern Plant, by Richard A. Grayson 1-75
How Alloy Steels Are Used Today . . . in Trucks, by Mark G. Morris 5-79

Tubing

- Appliance Maker Switches to Welded Tubing for Vacuum Cleaners (tn) 1-8
Beryllium Torque Tubes Save Weight in the F-111 (tn) 5-8
Hastelloy C Tubing Chosen for Saturn V Purge System (tn) 6-9
High Frequency Process Welds Thin Wall Tubing (tn) 2-10
Stainless Steel Condenser Tubes Carry Salt Water Coolant (tn) 6-8
Tantalum Clad Tubing Maintains High Heat Transfer Rate (tn) 1-8
Tight Tolerances Shorten Honing Time of Welded Tubing (sr) 6-118
Unique Rolled Tube Joint (sr) 6-118

Tungsten

- Consolidating Metal Powders Magnetically, by Donald J. Sandstrom 3-91
Permeability of Tungsten Matrices, by Allen T. Robinson (d) 5-158
Plasma Spraying of Tungsten and Zirconia, by Salvatore J. Grisaffe and William A. Spitzig (d) 1-166

Turbines

- Strong Rotor Alloy for Turbine-Generators (tn) 2-7
What Vacuum Degassing Means to Users of Steels . . . Makers of Turbine-Generators, by Sumio Yukawa 3-81

Turbines, gas

- Ford Turbine Truck Hits the Road (tn) 5-9

Vacuum degassing

- Arc Remelting Improves Vacuum Degassed Steel (d) 3-178
Vacuum Degassing: Key to Better Steels, by Carl R. Weymueller 3-74
What Vacuum Degassing Means to Users of Steels 3-81

Value engineering

- What Value Engineering Means Today, by R. Glenn Woodward 4-7

Vanadium

- Materials for the Navy, by Robert C. Bertossa (d) 6-148

Welding

- Electroslag Welds Join Thick HY 80 Plates, by Richard S. Rote 5-142
Heat Treating Welds in Austenitic Stainless, by R. N. Younger, D. M. Haddrell and R. G. Baker (d) 2-203
How Fast Can You Weld Constructional Alloy Steels?, by Arthur F. Bilby, William B. Blackburn and Roy C. Becker 4-152
Welding Ball Bearing Retainers (sr) 1-119
Welding by Plasma Arc, by R. L. O'Brien (d) 4-260
Welding Stainless Steel—The 200 and 300 Series, by Wayne L. Wilcox 1-121
Welding Stainless Steel . . . The 400 Series, by Wayne L. Wilcox 2-140
Welding the Newer Grades . . . AM-350, AM-355, AM-363 and the Muffler Alloys, by R. H. Kaltenhauser 2-125
Welding the Newer Grades . . . PH Alloys and Manganese Stainless Steels, by R. Harry Eppy 2-130
Welding Titanium . . . How to Weld Ti-6Al-4V Rocket Cases, by George L. Vonnegut, George R. Sippel and Dean K. Hanink 3-119
What Weld Metal for Type 316L Stainless Steel?, by R. Harry Eppy 3-109
Why We Converted to Semi-Automatic Welding, by Warren Dean 5-98
X7002: A New High Strength Weldable Aluminum Alloy, by Auvo I. Kemppinen, W. Bernard Jenkins and George E. Stein 1-100

Whiskers

- Materials for the Navy, by Robert C. Bertossa (d) 6-148
Reinforcing Materials With Fibers, by A. Kelly (d) 5-184
Using Filaments and Whiskers, by H. J. Wagner (d) 6-176

Wire

- Cladding Wire Continuously, by J. G. Kura (d) 4-271

Zinc

- Choose the Right Zinc Coating for Large Structures, by John R. Dassen 3-98

Zinc die castings

- Improved Process Specifications for Plated Parts, by William B. Harding 4-156
Rolled Zinc Alloy Readied for Trim and Functional Uses (tn) 5-10

Zirconia coatings

- Plasma Spraying of Tungsten and Zirconia, by Salvatore J. Grisaffe and William A. Spitzig (d) 1-166

(c) Correspondence; (cp) Critical Point; (d) Digest; (ds) Data Sheet; (sr) Short Runs; (tn) Technical News

Author Index

Alquist, H. Bud	6-140
Alhrand, William O.	5-102
Anderson, William J. (<i>d</i>)	1-148
Ansell, G. S. (<i>d</i>)	6-167
Arnold, Lynn E.	4-143
Austin, David E.	1-116
Baker, R. G. (<i>d</i>)	2-203
Bartlett, E. S. (<i>d</i>)	3-199
Beattie, H. J., Jr. (<i>d</i>)	5-181
Becker, Roy C.	4-152
Bertossa, Robert C. (<i>d</i>)	2-212,
	(<i>d</i>) 6-14
Billy, Arthur F.	4-152
Bison, Edmond E. (<i>d</i>)	1-148
Blackburn, William B.	4-152
Bloom, Raymond	3-82
Bloom, R. A. (<i>d</i>)	1-162
Blott, Deo M.	2-119
Boesch, William J.	1-109
Boettner, R. C. (<i>d</i>)	4-260
Bomar, E. Sloan	1-90
Bombberger, John C.	6-82
Boone, D. H. (<i>d</i>)	5-173
Bradd, Amos A. (<i>e</i>)	5-13
Brien, Robert E. (<i>d</i>)	5-176
Brown, H. (<i>d</i>)	3-182
Buell, Malcolm (<i>d</i>)	6-187
Byrne, Henry L.	4-197
Callaway, Samuel R.	5-83
Carswell, Donald D.	1-94
Caum, J. W. (<i>d</i>)	6-185
Christensen, R. H. (<i>d</i>)	4-296
Claus, R. J. (<i>d</i>)	3-182
Clauss, Philip J.	5-93; 6-78
Coburn, Kenneth G.	4-184
Crawford, J. D. (<i>d</i>)	4-262
Crooks, Ronald D. (<i>c</i>)	1-149
Czyzewski, Harry C.	1-136
Daesen, John R.	3-95
Dean, Warren	5-98
De Coste, J. B.	5-131
Dermott, Ralph G.	4-118
Divers, C. Kenneth	2-115
Divis, George A., Jr.	5-139
Dreyer, Gary A.	1-116
Duckworth, W. E. (<i>d</i>)	1-164
Dunn, R. G. (<i>d</i>)	4-266
Dvorak, Richard J.	2-174
Engel, Niels (<i>d</i>)	4-256
Espy, R. Harry	2-130; 3-109
Evans, David J. I.	1-80
Feltner, C. E. (<i>d</i>)	4-260
Floreen, S. (<i>d</i>)	4-268; 5-162; (<i>d</i>)
	6-178
Foerster, George (<i>c</i>)	1-136
Fogleman, Edgar L.	6-82
Fogleman, Edgar A. (<i>jr</i>)	6-82
Fostini, R. V. (<i>d</i>)	4-294
Fowler, Edward L.	2-111
Fraser, Robert W.	1-80
Freeman, Robert R.	4-161
Freyberger, Donald L.	6-82
Fritz, John C.	2-174
Garwood, Maurice F.	5-77
Gibeaut, W. A. (<i>d</i>)	3-199
Gideon, D. N. (<i>d</i>)	2-206
Goldhoff, R. M. (<i>d</i>)	5-181

Gray, Allen G.	(cp) 1-73; (cp) 2-73; (cp) 4-73; (cp) 7-73	1-90
Gray, Robert J.		1-90
Grasson, Richard A.		1-75
Grisaffo, Salvatore J. (d)		1-166
Guminski, R. D. (d)		3-196
Haddrill, D. M. (d)		2-203
Hagemmaier, Don		5-116
Hammond, C. M. (d)		6-167
Hanink, Dean K.		3-119
Hanna, G. L. (d)		6-167
Hansen, John V. E.	5-98; 6-63	5-167
Harding, William B. (d)	1-55; 3-167	1-167
Hays, Raymond H.		4-128
Herbert, David B.		6-87
Hiller, Herman F.		3-81
Holden, F. C. (d)		2-206
Hoover, Andrew N. (cp)		4-75
Huembogen, E. (d)		4-72
Humphrey, J. H. (d)		5-262
Hyer, W. S. (d)		2-206
Inman, M. C. (d)		5-173
Jenkins, W. Bernard		1-100
Johnson, Birger L.		3-116
Kaltenhauser, R. H.		2-125
Karchner, G. H. (d)		6-182
Keller, J. H. (c)		5-13
Kelly, A. (d)		6-184
Kemppinen, Auvo I.		1-100
Kiwak, R. S. (d)		4-250
Koch, C. C. (d)		4-290
Koehn, D. P. (d)		5-74
Kleint, Rod		5-115
Koenig, J. G. (d)		1-162
Koepcke, Ernest S.		2-152
Kropf, Charles J.		5-20
Kura, J. G. (d)		4-271
Laird, C. (d)		4-260
Leach, Frank R. (d)		5-181
Lawrence, G. D. (c)		1-136
Leak, D. A. (d)		1-164
Ledin, Theodore A.		3-82
Little, Carroll P.		3-88
Logan, Hugh L. (d)		2-272
Longabaugh, John		5-85
Mackivi, Vladimir N.		1-80
MacNeill, Charles E. (d)		3-200
Maloney, Harold A.		5-82
Marshall, C. W. (d)		2-206
Marshall, M. W. (d)		2-200
McClung, Robert W.		1-90
McClummonds, Norman L.		2-166
McEvilly, A. J., Jr. (d)		4-260
McMullan, O. W. (d)		4-240
McNamara, J. Burk		1-112
Mehrkam, Quentin D.		4-134
Meredith, F. M. P. (d)		3-196
Meyserson, Melvin R. (d)		4-292
Minkler, Ward W.		4-170
Moran, John J. P.		2-111
Morris, A. J. (d)		4-124
Morral, F. R. (d)		2-188
Morris, Mark G.		5-79
Mueller, John J.		3-158
Murphy, Donald W.		1-80

Norris, Elwood (<i>sr</i>)	5-119
Norton, Charles E.	3-83
O'Brien, R. L. (<i>d</i>)	4-260
Olofson, Carl T. 1-104; (<i>ds</i>)	1-106
Pelloux, Regis M. N. (<i>d</i>)	5-175
Perry, D. I. (<i>d</i>)	2-200
Phalen, D. I. (<i>d</i>)	4-288
Pressly, H. B. (<i>d</i>)	1-155
Richmond, Robert	5-90
Robinson, Allen T. (<i>d</i>)	5-135
Robinson, George H.	5-102
Rote, Richard S.	5-42
Rubin, Willard	3-81
Saarivirta, Matti J. (<i>d</i>)	4-296
Sandstrom, Donald J.	3-90
Sangdahl, G. Stanley	2-101
Schmidt, Richard	6-132
Schulte, William C.	3-83
Scully, Milton (<i>d</i>)	6-187
Semchynson, M. (<i>d</i>)	4-294
Siegrist, Fred L.	4-219; 5-121
Sinclair, Morgan	3-119
Sippel, George R.	3-354
Sitzer, Daniel H.	3-128
Slaney, John S.	1-109
Smith, W. Dianne	1-116
Sola, Marcos C. (<i>d</i>)	4-232
Speich, G. R. (<i>d</i>)	4-268
Spitz, William A. (<i>d</i>)	1-166
Staple, Elton E.	6-93
Stark, Philip (<i>d</i>)	6-182
Steigerwald, E. A. (<i>d</i>)	6-166
Stein, George E.	1-100
Stephenson, E. T. (<i>d</i>)	6-182
Storfer, Ernest J.	6-123
Stremba, H. J. (<i>d</i>)	6-185
Taylor, P. R. (<i>d</i>)	1-164
Tomaszewski, T. W. (<i>d</i>)	3-182
Troiano, A. R. (<i>d</i>)	4-290; (<i>d</i>) 6-166
Tuffnell, G. W. (<i>d</i>)	5-162
Tyson, Samuel E.	5-111
Van Wyk, Jan W.	3-10
Vaughan, D. A. (<i>d</i>)	4-288
Vonnegut, George L.	3-119
Wagner, H. J. (<i>d</i>)	6-176
Walz, H. (<i>d</i>)	1-162
Wernmueler, Carl R.	3-74; 3-148; 3-178; 4-138; (<i>d</i>) 5-154
Wilcox, Wayne, L.	1-121; 2-140
Williams, Paul A.	3-88
Willner, Elliott (<i>d</i>)	4-254
Wlodak, S. T. (<i>d</i>)	4-284
Wormet, H. Arthur	4-216
Wulpi, Donald J.	6-72
Yarne, John L.	5-86; (<i>c</i>) 6-13
Yeo, R. B. G. (<i>d</i>)	6-164
Yorke, David G. (<i>c</i>)	5-13
Younger, R. N. (<i>d</i>)	2-203
Yukawa, Sumio	3-81
Zotos, John (<i>d</i>)	3-196
Zwolsky, K. M. (<i>d</i>)	5-175

(c) Correspondence; (cp) Critical Point; (d) Digest; (ds) Data Sheet; (sr) Short Runs; (tn) Technical News

